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# The AUTOMOBILE

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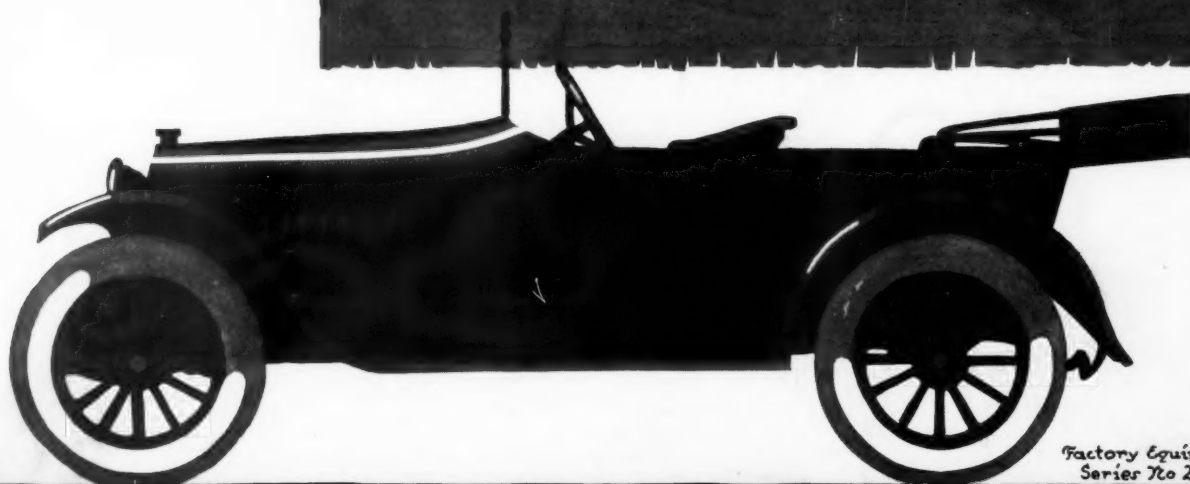
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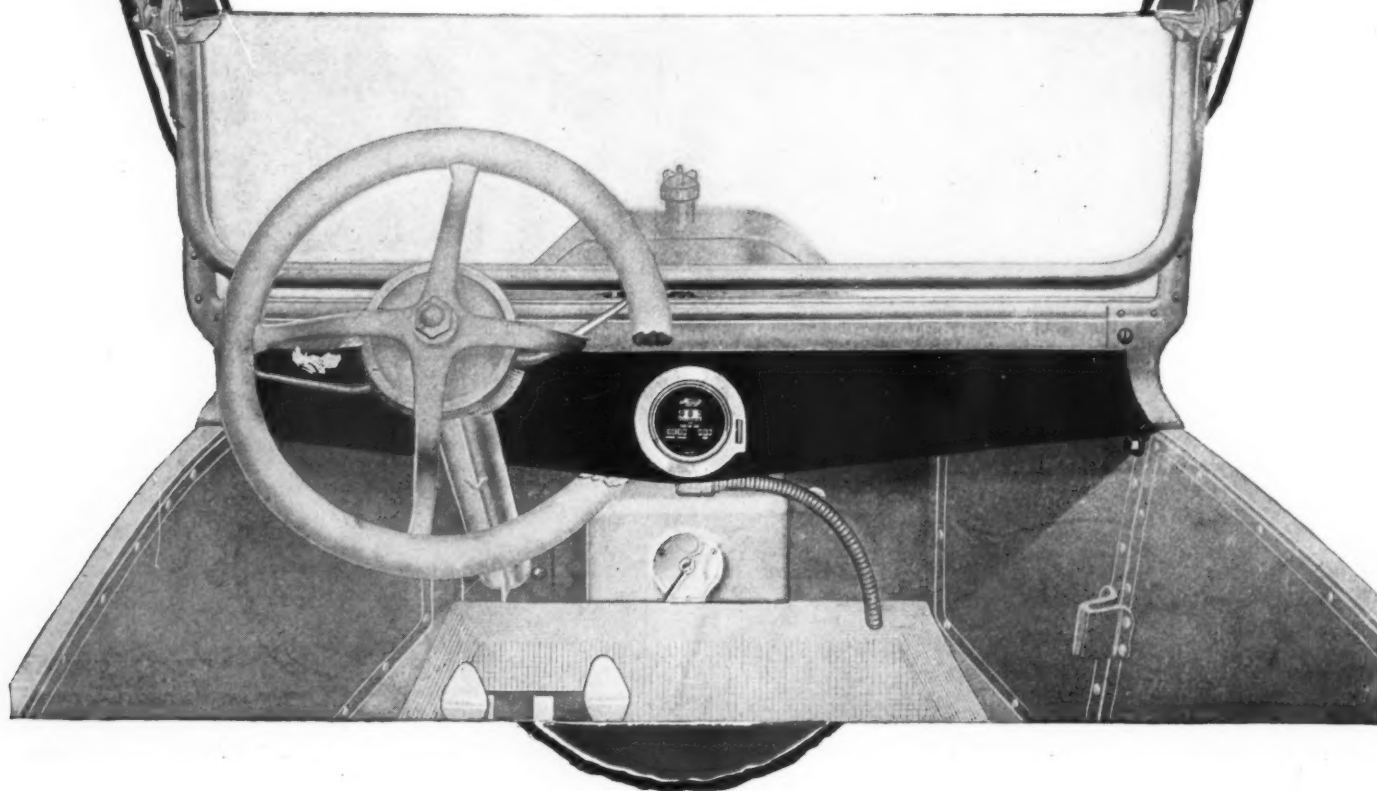
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# The AUTOMOBILE

VOL. XXXV

NEW YORK—THURSDAY, OCTOBER 26, 1916—CHICAGO

No. 17

## Kerosene Oil Men's Fuel Choice

### Resolution Adopted Recommending Kerosene—Endorse Good and Holley Vaporizers

CHICAGO, ILL., Oct. 24—That the use of kerosene offers the most hopeful solution of the fuel supply difficulty is a resolution accepted by the Independent Oil Men's Assn. and is the result of the report of a committee consisting of Prof. Lucke, head of the engineering department of Columbia University, Prof. Metzler of the same institution and M. J. Byrne, Waterbury, Conn. This committee was called the Gasoline Relief Committee and was appointed last April, since when it has examined a large number of devices and now recommends two specifically. One is the Good kerosene carbureter, the invention of John Good of Brooklyn, and the other the Holley kerosene carbureter.

#### To Have Fitting Experts

The Independent Oil Men's Assn. will arrange to appoint in each large city a special repairman to convert existing cars from gasoline to kerosene-burning vehicles and it is stated that the association may even go so far as to finance the repairshop for this purpose. This is sufficient proof that the association is absolutely committed to its resolution and will do everything possible to encourage the use of kerosene.

The convention at which this important resolution was passed is the eighth and was the best which the association has ever had, there being over 800 members present.

(Continued on page 724)

#### Anderson Buys Chicago Electric

DETROIT, MICH., Oct. 20—The Anderson Electric Car Co. has purchased the

Chicago Electric interests of the Walker Vehicle Co. and will shortly take over all the new Chicago Electrics completed and those in process of manufacture, together with all parts and service. The Walker Vehicle Co., which is owned by the Commonwealth Edison Co., will devote its efforts to the building and selling of Walker electric trucks. Gail Reed, general sales manager of the Walker company, has been engaged to promote the sale of electrics for the Anderson company.

#### Hackett Resigns Hackett Co. Presidency

JACKSON, MICH., Oct. 24—Mansell Hackett, president of the Hackett Motor Car Co., this city, has resigned the presidency to become the general manager of the company. J. S. Johnston of the Johnston Bros., shipbuilders at Ferrysburg, Mich., is the new president and J. L. Dornbos, cashier of the People's Savings Bank, Grand Haven, Mich., becomes treasurer. Other officers remain the same.

#### Miller Is Inland Sales Head

ST. LOUIS, MO., Oct. 20—L. B. Miller has been appointed sales manager of the Inland Machine Works, this city, maker of the Inland piston ring. He was formerly office manager of the St. Louis branch of the United States Tire Co.

#### Bour-Davis Starts Production

DETROIT, MICH., Oct. 23—The Bour-Davis Motor Car Co. has started production in its new plant, which has been building for nearly a year. The plant is a four-story building and the progressive assembly principle will be used.

#### American Motors Plant Adopts 8-Hr. Day

PLAINFIELD, N. J., Oct. 23—The 8-hr. day will be put into effect at the plant of the American Motors Corp., this city. The plant will employ several hundred men beginning Nov. 1.

## Packard Surplus Is \$10,823,717

### Gains \$6,206,419 in Final Year —Total Assets Increase \$11,830,505

DETROIT, MICH., Oct. 20—Packard assets have increased \$11,830,505 during the past year. More than \$6,000,000 have been added to the surplus, and a general prosperous business growth is displayed in the consolidated balance sheet for the fiscal year ending Aug. 31, which was submitted to stockholders of the Packard Motor Car Co. at their annual meeting in the company's general offices Thursday, Oct. 19. The report presents the company's financial statement and several paragraphs of explanation, among which it is stated that plant values amounting to \$1,250,000 were written off in excess of regular depreciation, making the total depreciation written off the Detroit plant, \$2,847,648.76 for the fiscal period.

The consolidated sheet of the Detroit and subsidiary companies shows \$6,206,419.61 added to surplus for the year and an increase of \$9,094,388.88 in value of inventories comprising raw material, work in progress and finished vehicles. The increase in inventories, it is explained, was not as great as the company's increase in vehicle production which was 186 per cent greater than in the preceding year.

During the year the company's authorized capital stock was increased from \$16,000,000 to \$21,000,000 by the addition of \$5,000,000 par value of common stock, and the issued capital stock was increased from \$7,065,300 of common and \$5,000,000 of 7 per cent cumulative preferred stock to \$11,656,930 of the authorized \$13,000,000 of common stock and to the total \$8,000,000 of authorized pre-

(Continued on page 693)

## Red Seal Battery Maker Enlarges

Re-Incorporates with Capital of \$5,000,000—To Increase Production and Plant

NEW YORK CITY, Oct. 24—To take care of increased production and factory facilities, the Manhattan Electrical Supply Co. has re-incorporated with a capital of \$5,000,000, divided into \$1,500,000 7 per cent cumulative first preferred, \$500,000 second preferred, also 7 per cent cumulative, and \$3,000,000 common. The old capital was \$1,500,000, divided into \$175,000 preferred and \$1,375,000 common. The common paid 14 per cent and the preferred 6 per cent.

This company, which manufactures and sells the Red Seal battery and also deals in a line of electrical appliances at its various stores, was founded in 1889 with a capital of \$1,300.

Gross Sales	Year
1901 .....	\$902,324
1915 .....	3,644,037
To Aug. 31, 1916.....	2,812,040

There will be no change in the present officers, who are: J. J. Gorman, president, and B. H. Ellis, vice-president and treasurer. Factory facilities will be added and new machinery installed.

The current net earnings applicable to dividends are estimated at more than five times the first preferred requirements. In the period of 2 years and 8 months to Aug. 31, 1916, the average earnings were more than four times the first preferred dividend requirements.

The net tangible assets, exclusive of good will, patent rights and trade marks, as of Aug. 31, 1916, were over \$2,490,000, or \$166 for each share of first preferred stock, and net quick assets more than \$1,600,000, or \$106 per share. Up to Aug. 31, there was \$489,847.91 cash in the bank.

The company will have no mortgage or funded debt of any kind. There will be a sinking fund, beginning Oct. 1, 1917, of \$30,000 per annum, payable \$7,500 quarterly to and including Jan. 1, 1921, and thereafter \$40,000 per annum, to be applied to the retirement of the first preferred at not over \$112.50 per share.

### Columbia Motors Leases Boat Plant

DETROIT, MICH., Oct. 23—The Columbia Motors Co. has leased the plant of the Michigan Steel Boat Co. and will take possession early in December.

### Banta Is Premier Vice-President

CHICAGO, ILL., Oct. 23—A. J. Banta, branch manager in Chicago for the Locomobile Co. of America, resigns Nov. 1 to become vice-president of the Premier

Motor Corp., Indianapolis. Mr. Banta has held his present position with the Locomobile Co. for the past 12 years. He is succeeded by J. Murray Page, manager of the Los Angeles branch of the Locomobile Co. Mr. Page has been in the service of this concern since 1899, spending part of that time in the Locomobile factory, and a part as branch manager in San Francisco.

### Hal Motor Car Co. Now

DETROIT, MICH., Oct. 20—The H. A. Lozier Co., Cleveland, has brought the name of that company into harmony with the car they manufacture and has re-incorporated as the Hal Motor Car Co.

### Sattley is Standard-Detroit Manager

DETROIT, MICH., Oct. 23—F. L. Sattley has been named general manager of the Standard-Detroit Tractor Co. Mr. Sattley is a member of the well known family of implement manufacturers.

### Sproat is Olds Works Manager

LANSING, MICH., Oct. 24—H. J. Sproat has been appointed works manager of the Olds Motor Works, this city. His immediate duties will be the enlargement of the factory to provide for an increase of production to more than 20,000 cars next year, almost double that of last.

### Hughes Resigns from Victor Parts

CINCINNATI, OHIO, Oct. 24—W. R. Hughes has resigned as sales manager of the Victor Auto Parts Co., this city, and is now secretary and treasurer and also manager of sales of the Corcoran Mfg. Co., this city.

## Raybestos Co. Incorporated for \$1,500,000

Will Take Over Royal Equipment Co. and Expand

BRIDGEPORT, CONN., Oct. 24—The Raybestos Co. has been incorporated under Connecticut laws with \$1,500,000 capital and will take over the Royal Equipment Co., manufacturer and distributor of Raybestos brake lining, brakes, etc. There will be no change in the policy of the company or the character of its products; dealer and jobber arrangements also remain unchanged. A 15-acre factory site has been purchased in Bridgeport and six new buildings will be erected which will double the capacity of the plant. There will be two buildings 100 by 600 ft., for weaving brake lining; one building 100 by 200 ft., for manufacture of brakes; one building 60 by 200 ft., for treating Raybestos; one building 60 by 300 ft., for manufacturing compressed sheet; one building 60 by 300 ft. for a storehouse and shipping department.

## White Surplus Is \$1,623,521

Co.'s Total Income for First 6 Months of 1916 Fiscal Year is \$2,750,923

NEW YORK CITY, Oct. 21—The White Motor Co., Cleveland, Ohio, reports a surplus of \$1,623,521, which is equivalent to 11 per cent on the \$16,000,000 capital stock. Net profits from operations were \$2,635,784 during the 6 months ending June 30, 1916. Adding \$115,208 in other income, brings the total income to \$2,750,923. The expenses of the company amounted to \$847,472 and the dividends up to the March 31 quarter to \$280,000, thus bringing the surplus to \$1,623,521.

The company has \$16,000,000 capital stock, \$50 par value, with no bonds and no preferred stock. The company is paying 7 per cent dividends on the stock. Net profits in the year 1915 were approximately \$8,700,000, over 54 per cent on the stock.

The combined balance sheet of this company and subsidiary companies as of June 30, 1916, as reported to the New York Stock Exchange, follows:

ASSETS	
Plant, equipment and real estate..	\$3,558,547
Good will, patents, etc.....	5,388,910
Materials and supplies.....	5,539,025
Accounts receivable.....	2,112,932
Bills receivable .....	804,967
Cash .....	2,022,337
Deferred assets .....	114,991
Total .....	\$19,541,710
LIABILITIES.	
Capital stock .....	\$16,000,000
Purchase money obligations.....	390,000
Current accounts, etc.....	1,282,535
Reserve for depreciation.....	85,902
Accounts and bills receivable.....	159,751
Surplus .....	1,623,521
Total .....	\$19,541,710

### Auto Specialties Absorbs Mich. Malleable

DETROIT, MICH., Oct. 21—The Auto Specialties Co., which has been located at Joliet, Ill., has absorbed the Michigan Malleable Co., and is opening its factory at St. Joseph, Mich. The company will occupy two buildings with approximately 75,000 ft. of floorspace.

### N. A. C. C. Banquet Jan. 9

NEW YORK CITY, Oct. 24—The annual banquet of the National Automobile Chamber of Commerce will be held Jan. 9 at the Waldorf-Astoria.

### Weidely Capital Now \$600,000

INDIANAPOLIS, IND., Oct. 23—The Weidely Motors Co. has just increased its capital stock from \$350,000 to \$600,000.



## National Plans for Expansion

**Offers 53,000 Shares in New Financing—6000 Cars for 1917**

NEW YORK CITY, Oct. 23.—One more company has joined the list of those which have been refinanced to take care of a larger production. The latest is the National Motor Vehicle Co., Indianapolis, Ind., which will be taken over by the National Motor Car & Vehicle Corp., organized under the laws of New York. The new company, which at first will be a holding concern, is offering 53,000 shares of stock to the public at \$42.50 per share. Twenty-seven thousand of these have been taken by the present National Motor Vehicle Co. interests. In other words over one-third of the total outstanding stock of the new company is to be taken by the present management and its associates. The company has no mortgage, no bonded indebtedness and no preferred stock. The refinancing is being handled by Pyne, Kendall & Hollister, and Leonard Snider & Co. The total capitalization is 80,000 shares without par value.

### Additions Under Way

The company is making several additions to its plant and the minimum output for 1916 has been placed at 6000 cars, as against 2499 cars last year.

The company is completing a new reinforced concrete building, 60 by 380 ft., three stories, which is located between the original buildings and the 400-ft. buildings completed last January. This addition gives a total of 626,000 sq. ft. floor space. Another strip of ground has recently been purchased on the east side of Yandes Street, opposite the present site, on which a further addition of a building is contemplated, 140 by 328 ft., one-story high for the present.

It is estimated that the net earnings for the year ending June 30, 1917, will be from \$1,000,000 to \$1,100,000 on a maximum output of about 6000 cars. This estimate is based upon orders actually taken and on contracts made by the company for needed materials. This is at the rate of 30 per cent on the subscription price of \$42.50 per share. Last year the earnings were \$425,000, equal to 12½ per cent on the capitalization of the new company at the issue price.

### Management Unchanged

The management remains unchanged. The officers of the existing company are: A. C. Newby, president; W. G. Wall, vice-president; and G. M. Dickson, general manager, secretary and treasurer.

The proposed directorate of the new company includes: A. C. Newby; S. A. Fletcher, president of the Fletcher-American National Bank, Indianapolis; O. J. Thomen, of Redmond & Co., New York; Leonard Snider of Leonard Snider & Co., New York; W. G. Wall; G. M. Dickson, and Buell Hollister of Payne, Kendall & Hollister, New York.

### Ford Co. Raises Probationary Salary

DETROIT, MICH., Oct. 24.—The Ford Co. has raised the salaries of workmen laboring under the probation system to 43 cents an hour, an increase of 9 cents over the former rate of 34 cents per hour. Ford employees are placed on a probation basis for 6 months and do not receive the \$5 a day salary until they qualify through their probation. As the Ford work day is 8 hr., probationers now receive \$3.44 per day in place of \$2.72. The raise was made because of the increased cost in living.

All women workers in factories and offices will receive the same wages as the men, \$5 per day after probation.

### Standard Motor Parts Buys New-castle Company

NEWCASTLE, IND., Oct. 23.—The New-castle Auto Parts Co. was sold last week to the Standard Motor Parts Co., this city. The latter company took over more than \$3,000 worth of obsolete Maxwell-Briscoe and Everett parts. The New-castle Auto Parts Co. was incorporated 2 weeks ago with a capitalization of \$200,000, and at the time of its organization announced it would occupy 20,000 sq. ft. of floorspace in the manufacture of parts, accessories and appliances for automobiles.

## Pullman Advances Car Price \$85

**Co. Will Concentrate on Four-Cylinder at \$825**

YORK, PA., Oct. 24.—The Pullman Motor Car Co., this city, has advanced its price to \$825 on its 1917 models. The company will concentrate on a four-cylinder model next year with a 32 hp. motor. There will be three types, including a two-passenger roadster, a four-passenger roadster and a five-passenger touring car.

The motor is little changed from last year, the changes covering mainly refinements. The bodies will be streamline and the standard color will be green. Other features include combined force feed and splash with an indicator on the dash; Splittorf starting and lighting; Carter vacuum tank for carburetor feed; Dixie magneto; and Stromberg carburetor.

## Corliss Truck Is Unique

**Special Patented Design Combines Frame and Body in Integral Unit**

CHICAGO, ILL., Oct. 23.—The Corliss Motor Truck Co., Corliss, Wis., is a corporation formed some time ago which is now manufacturing and ready to supply a new type of small truck. It is rated at 1000 lb. capacity and sells for \$695, the especial point being the use of an all-steel body, which is combined with the frame in such a way as to make the body a strength factor in the chassis. Because the weight of the body is thus utilized the weight of the complete car can be reduced without losing any strength.

The engine fitted is a four-cylinder 3½ by 4½ in. and there is a three-speed gearset with selective shift. The rear axle is bevel-driven, three-quarter floating and has double roller bearings to carry the load. Elliptic springs are used and pneumatic tires 31 by 4 in., the wheelbase being 100 in. The details are of a robust character.

It is stated that the company have excellent factory facilities and will be able to care for a large demand.

### Canadian Ford Passes Dividend

DETROIT, MICH., Oct. 24.—The Ford Co. of Canada has passed its dividend on account of large expenditures for additions and a war tax of \$750,000. The directors re-elected Henry Ford president; G. M. McGregor, vice-president and treasurer, and W. R. Campbell, secretary.

The Canadian company earned for the fiscal year of 10 months ending July 31, \$1,109,322.14, equal to 15.8 per cent on the outstanding \$7,000,000 of the company's authorized \$10,000,000 of capital stock.

### Gordon Is Hudson Traffic Manager

DETROIT, MICH., Oct. 25.—John Gordon has become traffic manager of the Hudson Motor Car Co., this city. Mr. Gordon was formerly with Dodge Bros.

### Fifth Avenue Buses Earn \$1,669,726.18

NEW YORK CITY, Oct. 24.—The Fifth Avenue Coach Co., this city, during its fiscal year, ending June 30 last, carried 16,223,042 passengers at 10 cents each, in its 132 buses, its revenue from this source amounting to \$1,622,304.20, an increase of \$217,257.10 over the previous period's operations. The company made 33.10 cents per active bus mile. Revenue from livery service, 19,460 bus miles, amounted to \$16,281.66 and advertising

privileges netted \$31,140.32, thus bringing the total revenue from operations to \$1,669,726.18, an increase of \$218,218.08 over the previous period. After deducting total operating expenses of \$1,064,690.36, the income was \$458,672.90, \$94,498.70 more than last year.

A feature brought out in the report of the company is that the 132 buses ran at a cost of only 21 cents per bus mile, each bus using six tires, the rear wheels each having two tires. This is based on a mileage of 4,966,995 and a total operating expense of \$1,064,690.36. New tires during 1916 cost \$54,533.63.

#### Daimler Representative Describes Tanks

DETROIT, MICH., Oct. 23—A. C. Hills of the English Daimler Co. is visiting Detroit on behalf of his company and of the British government. He is making a short trip and will be in the U. S. A. less than 2 weeks. Hills is credited with saying that the famous "tanks" are engined with Daimler power plants and are about 60 ft. long. Their weight, he says, is sufficient to push down a 6-in. tree trunk when the tank is driven direct at the tree. The original report that the tanks are composite vehicles made in different factories is thus confirmed.

A. C. Hills has been a prominent member of the British motor industry for many years and has been with the Daimler company since a short time after the latter's adoption of the Knight engine.

#### National and Premier Co.'s in New York

NEW YORK CITY, Oct. 25—The National Motor Car and Vehicle Corp. has been incorporated with 80,000 shares of no par value, to carry on business with \$800,000. The incorporators are R. S. Dodge, J. R. Lindemuth.

The Premier Motor Corp. has been formed with a capital of 20,000 shares, \$100 each, and 30,000 shares of no par value, to carry on its business with \$2,150,000. H. L. Thompson, I. P. Seery and J. C. Flowers, president of the company, are the incorporators.

#### Steel Tube Products Co. Formed

DETROIT, MICH., Oct. 21—The Michigan Steel Tube Products Co. has been incorporated for \$300,000 by Charles E. Miller, Howard A. Flagg and Frank Krititz, all formerly with the Standard Welding Co. of Cleveland. The new concern will manufacture steel tubing.

#### Troy Mfg. Co. Buys Studebaker Building

DETROIT, MICH., Oct. 24—The Troy Mfg. Co. has purchased the factory known as plant 5 of the Studebaker Corp. for \$100,000. The Troy company will use the factory for the manufacture of automobile bodies.

## Cleveland Considers Steam

### Abner Doble Describes His System to S. A. E. Section —Good Discussion

CLEVELAND, OHIO, Oct. 21—In a long paper tracing the development of the steam automobile in recent years Abner Doble of Detroit held the close attention of the Cleveland S. A. E. section last night. Doble dealt with the main factors which make for steam car success and failure, showed why it was that some of the earlier cars gave trouble and traced different methods by which the troubles had been overcome. He described his own boiler and engine system, already dealt with in THE AUTOMOBILE for Sept. 7, and explained how this came to be created by studying other types. The paper was extremely informative, and will be printed at length next week.

An excellent discussion followed the paper, and, in answering the questions asked, Mr. Doble touched upon both matters which had entered into his paper and others which he had left out in order that the paper might not be of too great a length. In answer to the first question, which was regarding the relative thermal efficiency of his steam power plant and a standard internal combustion engine, Doble pointed out that, at normal running speeds, the thermal efficiency of the steam engine is much nearer its maximum than is that of an internal combustion engine; in other words, that he did not claim a greatly increased thermal efficiency for his own power plant, but rather believed that there had always been a tendency to overestimate the thermal efficiency of internal combustion engines when pulling a heavy load at low speed.

#### The Weight Question

In regard to the difference in weight distribution caused by the placing of the engine upon the rear axle, Mr. Doble believes it to be a distinct advantage rather than disadvantage. One reason for this, upon which he laid emphasis, was the bringing the center of gravity of the car back to a point somewhat behind the physical center of the car, thereby improving the conditions of traction and lessening the tendency to skid.

When asked about the action which took place when the condensation of steam was allowed to form water in the cylinders, Mr. Doble described a feature of his engine which had not been brought out in his paper; viz.: a special design of valve whose lifting from its seat allowed either water or steam to escape into the steam chest whenever cylinder

compression exceeded steam chest pressure.

Various questions were next brought up concerning the fuel used and how it was supplied to the combustion system, to which Doble answered that no gasoline was used either in starting or running, kerosene being the only fuel carried, and that the kerosene was supplied to the combustion system by a pump without the use of air pressure.

The great differences between the lubrication of a steam engine and an internal combustion engine were effectively brought out in the discussion among a number of those present, Doble first bringing up the point of the lubricating qualities of the steam itself which was borne out in an exceedingly interesting way by one who had had considerable experience along this line in connection with locomotive work. Mr. Doble went on to say that the chief advantage of the oil which he did use was to keep the engine from rusting and the inner surfaces of the boiler from accumulating deposits.

#### U. S. A. Cars Sunk at Sea

NEW YORK, Oct. 24—The Dutch liner, Blommersdyk, bound for Rotterdam on Oct. 9, had on board twenty-five cases of automobiles and parts, without tires, when it was sunk by the German submarine U-53 off the coast of New England. The boat also carried one truck. The cars, it is stated, were shipped by the Kissel Motor Car Co. to its representative in Amsterdam.

A consignment of Scripps-Booth cars went down with the Lord Treggar when it was recently sunk by a torpedo in the Mediterranean.

#### \$750,000 Co. Formed in Maine

PORTLAND, ME., Oct. 21—The Pilgrim Motor Co., an organization with a capitalization of \$750,000 has been formed here to manufacture and deal in automobiles and accessories. The men behind it are all Maine residents. T. L. Croteau is president; James E. Mantir, secretary; A. B. Farnham, treasurer. These men with George S. Soule comprise the board of directors.

#### Doak Joins Ohio Electric

TOLEDO, OHIO, Oct. 21—R. C. Doak has been appointed assistant general sales manager of the Ohio Electric Car Co., this city. Mr. Doak has been in the electric car field since 1910 when he became branch manager of the Woods company. From there he went to the Anderson company and later returned to the Woods company.

#### Bowser Buys Site for Addition

FORT WAYNE, IND., Oct. 23—The S. F. Bowser Oil Tank & Pump Co. has bought a large tract of land, occupying an entire square, south of the present factory.



## New York Registers 303,223

267,825 Passenger Cars, 32,942  
Trucks and 2456 Dealers'  
Licenses Issued

NEW YORK CITY, Oct. 22.—For the first time in the history of this or any other State in this country, the registration in New York State has exceeded the 300,000 mark, exactly 303,223 cars and 98,203 persons having been licensed to date. There is now one automobile to each thirty-two persons in this State, the last census showing a population of 9,687,744 persons.

The combined total of motor vehicles in New York includes 267,825 passenger cars, 32,942 commercial vehicles and 2456 dealers' automobiles. Of the passenger cars, 139,026 were of 25 hp. or less, 82,191 less than 35 hp., 23,411 less than 50 hp. and 1001 of 50 hp.

The total of 98,203 chauffeurs includes 71,194 persons who were licensed last year and who have renewed their licenses this year for the first time.

The use of motor vehicles in this State has grown more rapidly this year than in any previous one since they became common. Figured upon a percentage basis, however, this increase is not quite so apparent, as the number registered this year has increased 27 per cent. Last year the increase was 31 per cent, the year previous 26 per cent and the year before that 25 per cent. In 1912 the gain was 27 per cent, in 1911 it was 24 per cent over 1910, the first year to require annual registration.

The total number registered has more than doubled since 1913 and is almost twice as much as the total registered in 1914, when there were 169,966. This year's registration is nearly five times that in 1910.

### 190,000 Cars in Iowa

DES MOINES, IOWA, Oct. 23—Iowa already has over 190,000 automobiles registered for 1916 and the total of registration fees has been \$1,636,000 or an average of \$8.58 per car. The number of dealers registered is 2641 and the fees from dealers amount to \$86,547.

### 23,033 Cars in Alabama

MONTGOMERY, ALA., Oct. 19.—The license year in this State ended Sept. 30 and 23,033 automobile licenses were issued, a gain of 100 per cent. Of these 17,740 were for pleasure cars, 3,888 for commercial trucks and 1,397 for motor cycles.

### Cotton Prices Boost Car Sales

ATLANTA, GA., Oct. 19—Automobile licenses are being issued in this State at

about the rate of 100 a day since cotton passed 16 cents. Last year 25,000 licenses were issued. Two weeks ago the 45,000 mark was passed for this year and it is expected that the 50,000 mark will be passed. Charles S. Barrett, President of the Farmers' Union, on his return from an extended inspection trip was asked as to the most notable feature of his trip. "The cotton money that is going into automobiles," he said.

### 115,000 Cars in Wisconsin

MILWAUKEE, WIS., Oct. 21.—The first census of motor-propelled vehicles taken in Milwaukee and Wisconsin just 10 years ago to-day, showed that there were 746 cars owned in Milwaukee, and 2578 in the State, including Milwaukee. To-day it is figured that there are 18,000 cars owned in Milwaukee, and approximately 115,000 in Wisconsin.

### Discher Patent Held Valid

MILWAUKEE, WIS., Oct. 20.—The Discher patent covering bumper bracket construction has been held valid and infringed by the Auto Parts Mfg. Co., of this city, and a permanent injunction has been granted in favor of Grant F. Discher, president and general manager of the Gemco Mfg. Co., this city, which controls the patent. The patent, No. 1,052,224, relates to a bumper bracket having a lug, which bears against the front end of the automobile frame side member, and an adjustable clamp, using a transverse bolt passing through two vertical slots, one on each side of the frame member.

John F. Harper has been appointed special master to determine damages. The decree was handed down by Judge Geiger in the U. S. district court for the Eastern district of Wisconsin.

The Auto Parts Mfg. Co. petitioned for an appeal to the U. S. circuit court of appeals for a temporary suspension of the injunction. The court granted the suspension on condition that the company file a bond for \$15,000 to cover any damages that might be sustained while the appeal was pending, should the higher court confirm the decree of the district court.

### Another Injunction for Prest-O-Lite

INDIANAPOLIS, IND., Oct. 22.—The Prest-O-Lite Co., Inc., has been granted a permanent injunction against the Power City Sun-Lite Gas Co., Sioux Falls, S. D., putting its gas into Prest-O-Lite tanks without removing the Prest-O-Lite Co. name and trade mark. The decree was issued by the U. S. district court for the district of South Dakota, southern division.

## S. A. E. Assets Are \$33,000

209 New Members Added Dur-  
ing Year—Hunt Succeeds  
Baton as Tire Chairman

WASHINGTON, D. C., Oct. 18.—The strong financial condition of the Society of Automobile Engineers was shown at to-day's meeting of the Council held in this city when the financial statement for the fiscal year was presented. The society has funds approximating \$33,000. At the end of the fiscal year, Sept. 30, the assets were: Certificates of deposits \$20,000, savings account \$2,000, bonds \$10,000 and \$860 checking account.

During the year 209 new members have been added as a net gain. In all 370 members have been enrolled, but there have been fifty-eight resignations, ninety-four dropped for non-payment of dues, and nine deaths. The new membership shows 150 members, 105 associate members, fifty-two juniors, five affiliates, seven affiliate representatives, and thirty-five student enrollments.

At to-day's meeting eighteen resignations were accepted and twenty-seven members added. H. L. Baton's resignation as chairman of the tire and rim division of the standards committee was accepted and O. E. Hunt appointed in his place.

### Exporters to Meet Oct. 31

NEW YORK CITY, Oct. 24.—The American Manufacturers' Export Assn. will meet Oct. 31 at the Hotel Biltmore. The session will be the seventh annual one. More than 400 persons are expected to be present. The afternoon will be devoted to a report of the members of the Industrial Commission to France, who will return to this country on Oct. 28.

### Humpage Goes to Wilt Drill

SYRACUSE, N. Y., Oct. 23.—F. R. Humpage has resigned as manager of the Dyneto Electric Co., this city, to become affiliated with the Wilt Twist Drill Co., Walkersville, Ont., in the capacity of secretary-treasurer and general manager. Mr. Humpage is well known in the automobile trade, having been with the industry since 1903 in executive positions with the Packard, Thomas and other companies.

### Carlton Is Bosch 'Frisco Manager

SAN FRANCISCO, CAL., Oct. 23.—B. R. Miller has resigned his position as manager of the San Francisco branch of the Bosch Magneto Co. and L. C. Carlton, previously in the engineering department at the main office, New York, succeeds him.

## Steel Prices To Be Steady

No Change Expected for 2 Years—Post Bellum Conditions Will Hold Up Prices

NEW YORK CITY, Oct. 23.—That there will be very little if any reduction in price of steel during the next 2 years is the opinion of a large manufacturer who has the reputation of being closer to the steel situation than anybody else connected with automobile and accessory manufacture. Just at the present time, due to the fact that less steel is being shipped abroad, and due to the seasonal slow-up on the part of automobile manufacturers there is plenty of steel to be had. Steel mills that have been very stingy on shipments are now in a position to make better shipments than formerly. The price remains stiff and there is no indication of any softening of the market.

A sales manager of one of the largest producers of steel entering into automobiles is authority for the statement that steel would be at least \$5 a ton higher inside of the next 4 months. He further believes that for the next 3 years the steel market will not be any lower than it is at present. So long as the war continues the demand for steel in U. S. A. will be great in response to the foreign and domestic demands. Even when the war stops a great amount of steel will be required from America for reconstruction work abroad so that there is little possibility of any lowering of the market.

Some of the Detroit automobile concerns report getting plenty of steel without much trouble. Representatives of three steel concerns in Detroit state that deliveries have been behind for the past 10 months, but that at the present time there is no indication of any change pointing towards any shortage different than what has existed.

### Marion Tire Elects Directors

MARION, OHIO, Oct. 19.—The stockholders of the Marion Tire & Rubber Co. held their first annual meeting at the factory recently, at which the directors were elected for the year. The following members were re-elected to the board of directors: W. H. Heverstott, C. W. Fairbanks, J. W. Jacoby, D. H. Lincoln, J. L. Price, C. W. Mapes, A. H. Trout and W. T. Jones. H. L. Gilbert was also elected a director.

### Gilbreth Talks on Motion Study

DETROIT, MICH., Oct. 21.—Frank B. Gilbreth, efficiency engineer, Providence, R. I., gave an interesting lecture before the Detroit Engineering Society last

night in which he discussed motion study as a science of determining methods of least waste in industry and told of his system of straight-line movement, describing how by means of electric lights and clock and other devices he photographed body movements of workers to ascertain waste and to discover means for efficient labor. Mr. Gilbreth told of many instances where his system has produced results amounting to three times as much production with less fatigue of the workers and described his methods in detail, illustrating many of them by moving pictures.

### Kjeldsen, Importers' Show Mgr., Dead

NEW YORK CITY, Oct. 25.—Stefan Kjeldsen, manager of the Importers' Automobile Show in this city and Chicago, and with the Holbrook Co., body builder here, died yesterday in this city. He was born in Denmark 34 years ago.

## Crude Oil Features Materials Market

NEW YORK CITY, Oct. 24.—Crude oil prices featured this week's activities in the automobile materials market. Pennsylvania crude has gone up to \$2.60 a barrel, its former record price. Refiners state that it is impossible to get the required quantity of different grades of crude, and the price has again been raised in the hope of increasing the supply. Producers were openly talking of \$3 for Pennsylvania crude when they heard of the new quotations.

Gasoline prices, it is stated, may soar, on account of the crude shortage. Some authorities state that on account of the large exports of petroleum, the oil production in this country will be inadequate to supply the increased needs of the refineries. Linseed oil has advanced 6 cents a gallon to 88 on account of higher flaxseed prices. Steel prices are holding strong with no changes. The automobile makers are now contributing their quota to the steel industry by coming in with contracts for the first half of 1917 and closing for their needs of forging bars and alloy steel up to July 1, 1917.

## 100-Point Rise in G. M. Common

Stock Goes to 830 — Rest of Issues Rise on Sympathetic Market

NEW YORK CITY, Oct. 23.—The automobile and accessories issues last week were in larger demand and consequently higher. A majority of the rises were large. General Motors, which rose 40 points the previous week, kept up its skyward movement with another rise of 100 points, reaching the record price of 830. This stock leads the motors while Firestone heads the accessories. Firestone has reached \$1,130 a share, just \$5 more than last week. The General Motors Corp. has made application to list on the Stock Exchange \$20,000,000 of 6 per cent cumulative preferred and \$82,600,000 common stock.

Hupp, Miller Rubber, Chalmers, Chevrolet, Studebaker, and United Motors featured with substantial rises. Hupp preferred rose 10 points; Miller Rubber, 10 points; Chalmers, 5 points; Chevrolet, 2 points; Studebaker, 3½ points.

Several new stocks were admitted to the Stock Exchange and Curb last week. White Motor has entered the Stock Exchange and the Spicer Mfg. Co., National Motor Car & Vehicle Co., and the Manhattan Electrical Supply Co. have put their stock on the Curb. Initial transactions on the Curb, Thursday, in Spicer first preferred amounted to 3600 shares with the high sale being 101½, or 1½ points above the price at which it was sold by the syndicate. The company's earnings are now running at the rate of \$100,000 net a month. The National stock has been offered at \$42.50.

### Drulard Graham Roller Bearing Inspector

DETROIT, MICH., Oct. 24.—Frank Drulard, chief inspector of the Bower Roller Bearing Co., has resigned to accept a similar position with the Graham Roller Bearing Co., of Coudersport, Pa.

## Daily Market Reports for the Past Week

Material	Tues.	Wed.	Thur.	Fri.	Sat.	Mon.	Week's Ch'ge
Aluminum, lb.	.65	.65	.65	.65	.65	.65	...
Antimony, lb.	.12¾	.13	.13	.13	.12¾	.13	.00¼
Beams Channels, 100 lb.	2.87	2.87	2.87	2.87	2.87	2.87	...
Bessemer Steel, ton.	45.00	45.00	45.00	45.00	45.00	45.00	...
Copper, Elec., lb.	.28½	.28½	.28½	.28½	.28½	.28½	...
Copper, Lake, lb.	.28½	.28½	.28½	.28½	.28½	.28½	...
Cottonseed Oil, bbl.	12.14	12.35	12.00	11.85	12.00	12.40	+.26
Fish Oil, Menhaden, Brown, gal.	.60	.60	.60	.60	.60	.60	...
Gasoline, Auto, bbl.	.22	.22	.22	.22	.22	.22	...
Lard Oil, prime, gal.	1.08	1.08	1.08	1.08	1.08	1.10	+.02
Lead, 100 lb.	7.05	7.05	7.05	7.05	7.05	7.05	...
Linseed Oil, gal.	.82	.83	.84	.88	.88	.88	+.06
Open-Hearth Steel, ton.	45.00	45.00	45.00	45.00	45.00	45.00	...
Petroleum, bbl., Kans., crude.	.90	.90	.90	.90	.90	.90	...
Petroleum, bbl., Pa., crude.	2.50	2.50	2.50	2.50	2.50	2.60	+.10
Rapeseed Oil, refined, gal.	.95	.95	.95	.95	.95	.95	...
Rubber, Fine Up-River, Para, lb.	.73	.73	.73	.73	.73	.75	+.02
Rubber, Ceylon, First Latex, lb.	.62½	.60½	.61	.61	.61	.61	-.01½
Sulphuric Acid, 60 Baume, gal.	1.50	1.50	1.50	1.50	1.50	1.50	...
Tin, 100 lb.	44.00	42.25	41.00	41.13	41.13	41.25	-3.75
Tire Scrap, lb.	.06	.06	.06	.06	.06	.06	...



## I.M.C. Extends Time To Oct. 30

### 400 Voting Trust Certificate Holders Have Deposited But Others Delay

NEW YORK CITY, Oct. 23.—The International Motor Co. is notifying holders of voting trust certificates of the preferred and common stock that the time to make deposits has been extended to Oct. 30. Over 400 holders, owning two-thirds of each class of stock, have deposited their certificates under the plan and reorganization agreement, but a large number of holders have not been heard from.

The company's indebtedness, aggregating nearly \$3,000,000, matures Nov. 1 next. Certificates should be deposited either by mail or in person with the Columbia Trust Co., this city.

### Stewart-Warner Earns \$604,939 in Quarter Ending Sept. 30

CHICAGO, ILL., Oct. 20.—The net earnings of the Stewart-Warner Speedometer Corp. for the third quarter show an increase of more than \$150,000 over the earnings for the corresponding period of last year. For the quarter ended Sept. 30 the net earnings were \$604,939; for the same period last year they were approximately \$450,000. This was announced after a meeting of the directors to-day. It has not been the policy of the corporation to make public such production figures, and this new departure is

said to be due to the fact that the stock recently has been listed on the Chicago stock exchange.

Other figures available at this time are those for the entire 9 months of 1916 so far. The net earnings for that period are \$1,880,072. Although this shows a continued large increase in business, the directors did not increase the dividend rate or vote an extra disbursement at their meeting to-day.

### Dividends Declared

Mitchell Motors Co., quarterly of \$1.50 a share, payable Nov. 24 to holders of record Nov. 10.

Stewart-Warner Speedometer Co.; quarterly of 1½ per cent on common, payable Nov. 15. Books close Oct. 30 and reopen Nov. 6.

Pyrene Mfg. Co.; quarterly of 2 per cent on common, payable Nov. 1 to stock of record Oct. 25.

Paige Motor Car Co.; monthly of 3 per cent, payable Nov. 30 to stock of record Nov. 1. Action has been deferred on proposed issue of \$1,500,000 preferred stock until Nov. 24.

### Miami Trailer Adds \$10,000

TROY, OHIO, Oct. 25.—The Miami Trailer Co. of this city has increased its capital stock \$10,000 to take care of factory additions for trailer manufacture. This action was taken at the annual meeting of the stockholders Oct. 11.

### Jones Opens Detroit Purchasing Office

DETROIT, MICH., Oct. 20.—The Jones Motor Car Co., Wichita, Kan., has opened a permanent office for its purchasing department at the Kresge Building here.

## Michigan Stamping Stock Issue

### Automobile Parts Concern Started on \$200—Capital Increased to \$1,500,000

DETROIT, Oct. 21.—Stockholders of the Michigan Stamping Co. were ratified an increase in capital from \$500,000 to \$1,500,000 at a special meeting held Oct. 20. The proposed increase will take the form of a stock dividend and will involve a reduction of the par value from \$100 to \$10 a share. The stock recently listed on the Detroit Stock Exchange is held at \$500 a share with none offered.

The Michigan Stamping Co. has experienced a remarkable growth. J. H. French, president of the concern and H. P. Cope, vice-president, started the business 12 years ago with a capital of \$200 with which they purchased a stamping machine on monthly payments. With the growth of the industry the company became more prosperous and acquired property which now includes several buildings valued at close to \$1,000,000. Last year the company purchased additional land and is now erecting a new plant to cover 6 acres.

### Runyan Cushion Wheel Co. Formed

OMAHA, NEB., Oct. 23.—The Runyan Cushion Wheel Co. has been incorporated with \$100,000 capital to manufacture a patent cushion wheel in this city. The incorporators are: A. L. Runyan, F. C. Burlingim, H. O. Wulff, D. R. Sowards, E. J. Conrad and J. E. Von Dorn.

## Automobile Securities Quotations on the New York and Detroit Exchanges

Ajax Rubber Co.	63	65	..
J. I. Case T. M. Co. pfd.	84½	86	+2½
Chalmers Motor Co. com.	100	105	+5
Chalmers Motor Co. pfd.	90	95	+5
*Chandler Motor Car Co.	106	106½	+½
Chevrolet Motor Co.	197	200	+2
Fisher Body Corp.	39	41	—½
Fisk Rubber Co. com.	100	105	+5
Fisk Rubber Co. 1st pfd.	110	120	+10
Fisk Rubber Co. 2d pfd.	100	110	+10
Firestone Tire & Rubber Co. com.	1130	1150	+20
Firestone Tire & Rubber Co. pfd.	110	111	+1
*General Motors Co. com.	830	875	+45
*General Motors Co. pfd.	126½	126½	+3½
*B. F. Goodrich Co. com.	74½	74½	+1½
*B. F. Goodrich Co. pfd.	114½	114½	+½
Goodyear Tire & Rubber Co. com.	296	298	+2
Goodyear Tire & Rubber Co. pfd.	108	109	+1
Grant Motor Car Corp.	8	10	+2
Hupp Motor Car Corp. com.	5	5	—
Hupp Motor Car Corp. pfd.	90	100	+10
International Motor Co. com.	4½	6	+1½
International Motor Co. pfd.	17	25	+8
*Kelly-Springfield Tire Co. com.	78½	79	+1½
*Kelly-Springfield Tire Co. 1st pfd.	98	100	+2
*Lee Rubber & Tire Corp.	42½	43	+½
*Maxwell Motor Co. com.	89½	90	+½
*Maxwell Motor Co. 1st pfd.	87	87½	+½
*Maxwell Motor Co. 2d pfd.	55½	56½	+1
Miller Rubber Co. com.	250	260	+10
Miller Rubber Co. pfd.	105	107	+2
National Motor	42½	43½	+1
Packard Motor Car Co. com.	170	180	+10
Packard Motor Car Co. pfd.	95	100	+5
Paige-Detroit Motor Car Co.	36½	37½	+1
Peerless Truck & Motor Corp.	24	25	+1
Portage Rubber Co. com.	174	176	+2
Portage Rubber Co. pfd.	173	174	+1
Regal Motor Car Co. pfd.	17	22	+5
Reo Motor Car Co.	43½	44	+½
Saxon Motor Car Corp.	80	80½	+½
Spicer Mfg.	101½	101½	—
Springfield Body Corp. com.	92	95	+3
Springfield Body Corp. pfd.	120	130	+10

Standard Motor Construction Co.	7½	8	—½
Stewart-Warner Speed. Corp. com.	113	114	+1
Stewart-Warner Speed. Corp. pfd.	113	114	+1
*Studebaker Corp. com.	135	135½	+½
*Studebaker Corp. pfd.	111	112	+1
Stutz Motor	68	69	+1
Swinehart Tire & Rubber Co.	86	92	+6
United Motors Corp.	66½	66½	—
*U. S. Rubber Co. com.	61	61½	+½
*U. S. Rubber Co. pfd.	111½	112	+½
White Motor Co.	57	59	+2
*Willys-Overland Co. com.	46½	46½	—
*Willys-Overland Co. pfd.	103	104	+1

\*At close Oct. 23, 1916. Listed New York Stock Exchange.

†Ex-div.

Quotations by John Burnham & Co.

## OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS			
Auto Body Co.	41	43½	—½
Chalmers Motor Co. com.	100	107½	+7½
Chalmers Motor Co. pfd.	90	94	+4
Continental Motor Co. com.	36	37½	+1½
Continental Motor Co. pfd.	9½	10½	+1
Ford Motor Co. of Canada.	270	300	+30
General Motors Co. com.	775	825	+50
General Motors Co. pfd.	123	126½	+3½
Maxwell Motor Co. com.	90	92½	+2½
Maxwell Motor Co. 1st pfd.	86	89	+3
Maxwell Motor Co. 2d pfd.	55	57½	+2½
Packard Motor Car Co. com.	100	102	+2
Packard Motor Car Co. pfd.	36	37½	+1½
W. K. Prudden Co.	48	50	+2
Reo Motor Car Co.	43½	47	+3½
Studebaker Corp. com.	134½	137½	+3
Studebaker Corp. pfd.	109	110	+1
C. M. Hall Lamp Co.	28½	31	+2½

## INACTIVE STOCKS

Atlas Drop Forge Co.	..	33	..
Kelsey Wheel Co.	55	60	..
Regal Motor Car Co. pfd.	18	..	..

## Hudson Engine in Test Runs

### Trials To Prove Counterbalanced Crankshaft Reduces Internal Friction

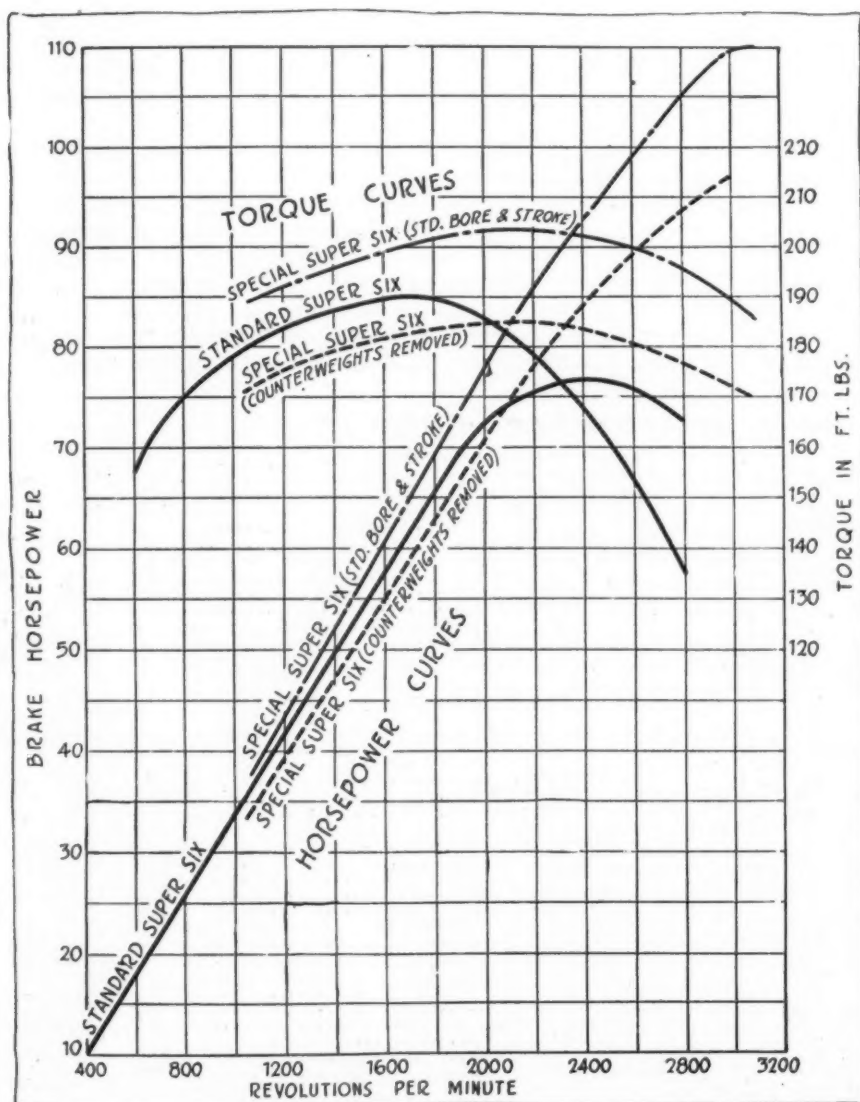
DETROIT, MICH., Oct. 12—In order to demonstrate the fact that the counterbalanced crankshaft reduces the internal friction of an engine, the Hudson company made to-day a series of runs with the counterbalanced shaft and with the shafting nearly in static balance. The first run was made to obtain maximum power, this being reached at 3100 r.p.m. when 110 hp. was developed. The connecting-rod bearings were then adjusted and a 40-min. run at 3000 r.p.m. was made, the horsepower varying between 100.4 and 103.5. At the conclusion of this second run the weights on the crankshaft were removed and a steel ring attached to the center throw in order to bring the shaft into static bal-

ance. This having been done, the test was repeated, first for maximum power and second for endurance. The latter test only lasted for 2 min., 30 sec., as the cap of one of the connecting-rod bearings became loose and was thrown off.

It will be noticed from the curves published herewith that the special engine with which the tests were made both with and without counterweights, gives practically the same reading as the stock Hudson engine up to 2000 r.p.m., but that considerable divergence commences at this point. The similarity between the torque curves of the special Super sixes is characteristic of the kind of difference caused by internal friction.

#### Double Assessment for Speedway

ST. PAUL, MINN., Oct. 20—Petition for a double liability stock assessment against shareholders in the Twin City Speedway Assn. has been granted Receiver P. W. Herzog, by Judge J. C. Michael, attorney. An informal offer of \$180,000 is the best received to date for the plant.



Power curves obtained by Hudson in tests of special and standard Super six engines

## Salesmanship Club in New York

### Automobile and Accessory Concerns Among Members of Growing Organization

NEW YORK CITY, Oct. 19—The New York Salesmanship Club, which is an outgrowth of the World's Salesmanship Congress held in Detroit in July has been formed and held its initial meeting last evening at the Waldorf-Astoria with about 2000 men present.

The club is one of a number being formed throughout the United States for the "Betterment of Business Through the Betterment of Salesmanship." Its work will include meetings every 2 weeks at which practical sales workers will speak and answer questions in an open forum. The plan is similar to that worked out by the Detroit club, which fathered the Congress, last summer.

It is proposed to have a permanent home for the club as soon as funds are available.

The membership list is growing rapidly. Life sustaining memberships may be purchased now by paying \$250. The other memberships are:

Sustaining, \$50 a year for 5 years.

Associate, \$10 a year until Dec. 31 and \$20 a year thereafter.

Initiation will be \$10 after the membership list begins to assume proportions.

This makes it possible for the individual salesman to get in now for \$10 and enjoy a year of membership. Thereafter it will cost him \$20 a year.

One of the features of the meeting was the variety of businesses represented and the caliber of the men who participated. There were big insurance companies, manufacturing concerns, food products makers and others. A few of those who bought life memberships follow as an indication of the variety of companies:

Packard Motor Car Co. of New York, General Roofing Mfg. Co., Dictaphone Co., Aetna Life Insurance Co., Computing Tabulating Recording Co., Rutherford Rubber Co., Fairchild Advertising Co., Royal Baking Powder Co., Dexter Folder Co., and L. K. Comstock & Co.

Others taking sustaining memberships were: American Fastener Co., Efficiency Engineer John M. Bruce, Cutler Hammer Mfg. Co., Union Central Life Insurance Co., Hodgman Rubber Co., Drummond Detective Agency, Matheson Lead Co., Bowman Automobile Co., Baker Linen Co., and others.

The officers of the New York club are: President, C. Louis Allen, president of the Pyrene Mfg. Co.

First vice-president, Douglas Barnes, president of the Barnes Knitting Corp.

Second vice-president, George W.



Crouch of the Underwood Typewriter Co. Treasurer, Oscar Coolican, New York manager of the National Cash Register Co.

Secretary, L. J. Mosness, Barnes Knitting Corp., 303 Fifth Avenue.

At last night's meeting addresses were made on salesmanship, its importance and the need for making it a science, by Norval A. Hawkins, president of the World's Salesmanship Congress and sales manager of the Ford Motor Co.; Hugh Chalmers, Chalmers Motor Co.; C. Louis Allen, Pyrene Mfg. Co.; and Edward A. Wood, president of the National Underwriters' Assn., Pittsburgh.

These men went on to-night to Philadelphia where a meeting of a new but rapidly growing club is being held. The Philadelphia club is said to be the best in the country. To date twenty-seven clubs have been formed and others are planned.

#### Harroun Plans 5-Year Contracts

DETROIT, MICH., Oct. 20—The Harroun Motors Corp. plans to make all contracts with dealers on a 5-year basis instead of the 1-year term now generally in use. The plan is to be operated because the Harroun company does not believe the short term system works to a fair advantage for dealers, since a manufacturer is enabled to transfer his line with another dealer after one year and thus causes the original dealer to lose the efforts made toward the end of the year and all sales on parts for cars he sold.

#### Elkhart and Westcott at Shows

NEW YORK CITY, Oct. 23—The Elkhart Carriage & Motor Car Co., Elkhart, Ind., will exhibit at the National show at the Grand Central Palace, Jan. 6. The Westcott Motor Car Co., Springfield, Ohio, will exhibit at the Chicago national show.

#### Plan Wheel Tax for Minnesota

ST. PAUL, MINN., Oct. 20—The supreme court of Minnesota has upheld the Duluth wheel tax law. A similar law for the State is now planned. The Twin Cities have been waiting for the decision to submit drafts for ordinances. The Duluth ordinance imposes a tax on all vehicles using city streets, the proceeds to be employed in repairing and improving the city streets.

#### Crawford Founder Dies at 70

HAGERSTOWN, MD., Oct. 13—R. S. Crawford, founder of the Crawford Automobile Co., this city, and one of the pioneer bicycle makers in this country, died yesterday in Pittsburgh at the age of seventy. He was a native of Gettysburg, Pa., and a graduate of the Mechanical Engineering School of Glasgow, Scotland.

## 27 Harkness Trophy Entries

### Leading Drivers and Fastest Cars for 100-Mile Race

NEW YORK CITY, Oct. 23—Twenty-seven entries have been made for the 100-mile race for the Harkness Trophy at the Sheepshead Bay Speedway, Oct. 28. This trophy was won last year by Resta in his Peugeot in 56:55:71 or at 105.39 m.p.h. As this is practically the final speedway event of the year, the entry list will be a large one and will include all the drivers who have won places in this year's races.

There will be \$12,500 in prizes, \$10,000 of which will go to the first six cars to finish in the 100-mile race and \$2,500 in lap prizes to the leaders of each lap after the 10th mile in a 50-mile special race for non-winners.

The list of entries to date follow:

Car	Driver	Car	Driver
Peugeot	De Palma	Crawford	Klein
Peugeot	Resta	Crawford	Chandler
Peugeot	Aitken	Crawford	D'Alene
Peugeot	Wilcox	Hoskins	Hughes
Maxwell	Rickenbacker	Hudson	Vall
Maxwell	Henderson	Ogren	Burt
Premier	Galvin	Ogren	Henning
Premier	Lewis	Adams	Adams
Duesenberg	Devlin	Benedict	Benedict
Duesenberg	Milton	Weightman	Weightman
Duesenberg	Devore	Lenten	Lenten
Duesenberg	Buzane	Olson	McBride
Delage	Devigne	Olson	Watson
Delage	LeCain		

#### De Palma Gets 50-Mile Record

NEW YORK CITY, Oct. 20—Ralph De Palma was granted to-day an official 50-mile speedway record for his performance on the Omaha 1½-mile speedway in his Mercedes racer July 15. The record for the 50 miles is 29:02.47, or a speed of 103.45 m.p.h. The previous record was held by Dario Resta in his Peugeot and was established by him June 8, 1916. Resta's time was 31:57.40. In addition to granting this record the contest board of the A. A. A. in regular session to-day reinstated driver Hirst; and refused a telegraph application of Eddie Hearne, now driving with an outlaw organization.

#### California Trucks on Desert Ramble

DETROIT, MICH., Oct. 21—Motor trucks in southern California will begin a ramble out of Los Angeles this morning. The trip is promoted by the Motor Truck Dealers' Assn., and is under A. A. A. sanction. It will last 2 days and will cover a course over the desert.

#### Weather Halts Master Driver Run

CHICAGO, ILL., Oct. 20—The second annual run for the title of master driver of the Chicago Automobile Club, which started here Oct. 19, was halted at Peoria

this morning after having completed only 1 day of the 3-day drive. It was scheduled to end at Chicago on Oct. 21. Al Schiller, driving a Mercer, was the only one of the six starters to reach Peoria with a perfect score and consequently probably will be awarded the master driver title and the gold medal which were offered to the winner by Barney Oldfield.

Road and weather conditions made it necessary for the officials to curtail the event, so that instead of the 500-mile 3-day run from Chicago to Peoria, to Davenport, Iowa, to Clinton, Iowa, and return to Chicago, the 186 miles to Peoria probably will be considered the complete contest.

#### Two Races for Uniontown Speedway

UNIONTOWN, PA., Oct. 23—Sanction has been granted by the American Automobile Assn. for two races to be held on the 1½-mile board speedway here on Thanksgiving Day. The major race will be 112½ miles or 100 laps of the track and will be for cars of 300 cu. in. displacement or under. Prizes for this race will total \$3,000, first place carrying \$1,000.

A free-for-all race of 54 miles restricted to dealers residing within 150 miles of Uniontown will carry prizes totaling \$1,250, first prize being \$500.

#### Racing Active on Pacific Coast

LOS ANGELES, CAL., Oct. 18—Racing activities on the Pacific Coast this year will be featured by at least three events in addition to the Vanderbilt Cup and Grand Prize races on the Santa Monica course, Nov. 16 and 18.

According to plans, there will be a 200-mile championship award sweepstakes on Thanksgiving Day at the Ascot speedway with a purse of \$5,000. Sanction has been applied for. Races are also planned for on both Christmas and Washington's Birthday, as well as March 17. San Francisco, Fresno and Bakersfield tracks will also hold minor events under the management of the county fairs.

#### Ross Climbs Record Hill

SAN FRANCISCO, CAL., Oct. 20—Fillmore Street hill, a grade running as high as 25½ per cent, has been climbed on high gear by a Ross eight. Never before, it is said, did a car perform that feat.

J. H. Stelling, of Arnold, Stelling & Co., Ross northern California distributors, drove the car and Ed. Rainey, executive secretary of the mayor, acted as official observer. The gear was chained and padlocked in high by L. J. Pinkson, automobile editor of the San Francisco Chronicle.

## No Simple Test for Gasoline

### Bureau of Standards Aims at Definition of Gasoline and Consumers' Protection

WASHINGTON, D. C., Oct. 20—Necessity for a careful and scientific investigation of the properties of various grades of gasoline before any standardization will be possible is emphasized in a statement issued by director Stratton of the Bureau of Standards. The impossibility of formulating a simple test which can be applied by any purchaser to detect at once an inferior gasoline is brought out as follows:

In the first place, no such simple test is known in the present state of the science of petroleum technology. In the early days of the petroleum industry, when all our gasolines, kerosenes, fuel oils, and lubricating oils were derived from one source, viz., Pennsylvania crude petroleum, a simple measurement of the specific gravity, or what amounts to the same thing, the Baumé number, by means of a hydrometer, served as a fairly reliable indication of the qualities of these products. To-day, however, the specific gravity test is practically worthless as a check on the suitability of a gasoline, for example, for a given motor equipment. The reason why this is so is that many new oil fields have been opened up in recent years that yield petroleum of very different physical and chemical properties, and new methods of manufacture have been introduced that yield products having very different properties in no way related to the specific gravities.

#### Work Is Complicated

It is highly probable that the specification or definition of standard gasoline, and the tests that will be necessary to determine whether the gasoline complies with the specifications, will be quite complicated and will require the services of a trained chemist to make them. It seems most probable that the definition of gasoline will have to be based on the percentage that distills over between specified temperatures, when the distillation is carried out under specified conditions. This distillation test, speaking in non-technical terms, is a measure of the freedom with which the gasoline will vaporize. The gasoline must not vaporize too freely for two reasons, one that it would not be safe, and secondly its loss in storage, by evaporation, would be too great. Hence, the specification may have to contain limitations of the percentage distilling over below a certain temperature, coupled, perhaps, with a proviso that certain percentages shall

distill over below other fixed temperatures, in order that requisite amounts of low-boiling constituents shall be present to insure easy starting of an engine. Likewise the specification must contain a provision that all must distill over below a certain maximum temperature, in order to exclude from the gasoline the heavier petroleum distillates, such as kerosene.

Complicated as such a specification has been briefly outlined above may seem to the layman, it is not at all improbable that other tests must be devised to limit the percentage of so-called aromatic and unsaturated hydrocarbons that may be permitted in a good automobile gasoline.

The question still arises whether or not it may be necessary to define two or more grades of automobile gasoline.

The message which it is particularly desired to convey is that the public should not expect hasty action.

#### National Legislation Possibilities

National legislation relating to interstate commerce, making it unlawful to sell a product under the name of "gasoline" that does not come within the specifications, with a suitable inspection service, would be an important contributing factor in safeguarding the consumer's interests. Other products, which might be just as good fuels for engines and carburetor equipments adapted to them, could not then be sold in interstate commerce under the name of "gasoline," but would have to be called motor fuels or by some other name which would distinguish them from the standard "gasoline." To protect the interests of the consumer in intrastate commerce it would be necessary for states and municipalities to adopt similar legislation and to increase their inspection service to provide for this new work, just as they have provided for weights and measures and pure food regulations in the past.

#### Molasses as Gasoline Substitute

NATAL, SOUTH AFRICA, Oct. 19—Molasses distillate is the latest gasoline substitute. That its makers are confident of its success as a fuel is assured by the recent organization of a company here under the title of South African Natalite Motor Spirit Co. with a capital of \$375,000. This company is expected to build a complete plant large enough to make in the aggregate 2,000,000 gal. of natalite, as it is known, per annum and to do this at the rate of 6000 gal. a day.

Experiments were made in Natal with a 22-hp. car weighing some 3600 lb. The car was tested over several routes, the total distance covered being slightly more than 500 miles. The amount of fuel used was 30.59 gal., or an average of 16.4 m.p.g. The engine on all occasions started easily and the valve cups and valve heads were clean after the trial.

## Locomotive Co. Adds Tractors

### Milwaukee Concern Will Build Gasoline Truck Tractors for Freight Work

MILWAUKEE, WIS., Oct. 23—The Milwaukee Locomotive Mfg. Co., pioneer builder of gasoline locomotives, is placing on the market a new type of gasoline truck tractor. It is somewhat similar in appearance and uses to the electric industrial trucks at present in use by various large railroads. It is intended for the handling of freight at railway terminals, steamship docks and freight houses. Power is supplied by a four-cylinder, vertical, block engine with a bore and stroke of 3¼ and 4½ in., power being transmitted through a bevel gear differential and external gear-drive axle. The truck will transport 4000 lb. on its platform and will haul a trailer load of 3½ tons.

#### Levy Gets Chalmers Again

DETROIT, MICH., Oct. 21—The James Levy Motor Co., Chicago, has been appointed the sole distributor of Chalmers cars for Chicago and vicinity. James Levy was the original Chalmers dealer in Chicago and sold Chalmers continuously until a few months ago when the agency was given Harry Newman, Inc. Levy is one of the best known dealers in Chicago.

In addition to the Chalmers cars Levy at the present moment is distributor for Scripps-Booth, Hal, Saxon, Marion-Handley and Premier. Whether or not all of these lines will be continued has not been determined as yet.

#### Accessories Branch of Hardware Assn.

ATLANTIC CITY, N. J., Oct. 20—The automobile accessory jobbers in the National Hardware Assn. at the annual convention here this week formed an Automobile Accessories Branch. The chairman of the division is Edward Rose, of Barker, Rose & Clinton, hardware and accessory jobbers, Elmira, N. Y. In the hardware associations are about 400 jobbers and about twice as many manufacturers. Between 600 and 700 men attended the convention.

#### Illinois Automobile Trade Assn. Now

ROCKFORD, ILL., Oct. 18—The Illinois Automobile Trade Assn. is now the name of the Illinois Garage Owners' Assn., which closed its 2-day convention here last night. The organization will constitute the Illinois division of the National Automobile Trade Assn.

The association now has 350 members divided among ten or twelve local or-



ganizations. About 100 attended the convention, thirty of these being delegates.

The association decided to ask for a conference with the National Automobile Chamber of Commerce before formulating a standard service warranty.

Gail Reed, general sales manager, Walker Vehicle Co., Chicago, read a paper on Measured Garage Service vs. Flat Rate. He contended that the garage business is turning to the measured rate and that within another year it will be hard to find a garage charging the flat rate for service.

#### N. E. Jobbers to Meet Nov. 22

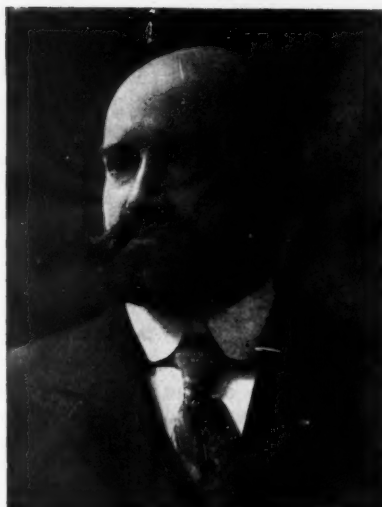
BOSTON, MASS., Oct. 23—The jobbing trade in New England is to be more closely affiliated with the National Assn. of Automobile Accessory Jobbers, according to the object announced for a meeting to be held in this city Nov. 22. The ways and means committee of the association is to hold a meeting here Nov. 20 and 21 and following its sessions, a general meeting of the whole New England trade will be held.

#### Deutsch & Bell Factory Representatives

CINCINNATI, OHIO, Oct. 23—Norman Bell, sales engineer of the motor accessory department of the Lunkenheimer Co., Cincinnati, has resigned. With S. Deutsch he has formed the firm of Deutsch & Bell with offices at 650 Woodward Avenue, Detroit. The firm will operate as factory representatives.

#### Studebaker Occupies New Texas Building

DETROIT, MICH., Oct. 20—The Studebaker Corp. is now occupying its new



F. H. CLARKE

Mr. Clarke is president of the Kent Motors Corp., which plans to establish a \$500,000 plant in Belleville, N. J., with potential capacity for 50,000 cars a year. The line will comprise four-cylinder touring and roadster models, selling at \$985

building at Fort Worth. L. B. Alford is district manager for Texas. The new structure is 150 by 265 ft., two stories high and cost \$60,000.

#### Standard Service Policy in Canada

MONTREAL, QUE., Oct. 23—A standard service policy will probably shortly be adopted in this country, following the adoption of standardization in the United States by automobile manufacturers. A standard policy has been drawn up and sent to the manufacturers for approval, and already have endorsed the policy, and its general use by manufacturers is

thought to be assured. A framed copy of the policy will be hung in the sales-room so that buyers will have an opportunity of seeing just what to expect in the way of service.

#### K. C. Dealer's Tour Brings Sales

KANSAS CITY, MO., Oct. 23—The Motor Car Dealers Assn. made a week's tour of northeastern Kansas costing \$15,000, including the expenses and time of two or more men from each of thirty-five companies and a band of fourteen pieces.

The direct result to dealers making the trip was sales of from \$750 to \$15,000; the indirect result will be many times that, judging from the effects in stimulation of business of previous similar trips.

#### Atlanta Show a Success

ATLANTA, GA., Oct. 19—A tent covering more than 34,000 sq. ft. proved inadequate to house the automobile exhibits at the Southeastern fair here this week. Thirty-five local automobile selling companies had exhibits and numerous tire and accessory concerns were represented. Southern automobile men said it was the largest display ever offered south of the Mason & Dixon line.

#### 38 Liberty Cars in 1 Day

DETROIT, MICH., Oct. 20—Production at the plant of the Liberty Motor Car Co., this city, is increasing each day. The company reports a single day's production on Oct. 13 of thirty-eight cars. The first car built was shipped but 3 months ago on July 4.

## Packard Surplus Gains \$6,206,419 in Fiscal Year

(Continued from page 683)

ferred stock. Of the new stock issued, \$4,591,630 of common stock was put out in the form of stock dividends. Proceeds from the sale of the \$3,000,000 of preferred stock issued during the year provided part of the increase in working capital necessitated by the company's large expansion in business and enlargement of plant facilities.

The liabilities include \$3,000,000 of 5 per cent gold debenture notes due Dec. 1, 1916. Since the close of the fiscal year arrangements have been completed for retirement of these notes and the acquisition of \$2,000,000 additional working capital through the sale of \$5,000,000 of 5 per cent gold notes to William A. Reid & Co., New York banker. The new

notes will be dated Oct. 15, 1916, and will be due Oct. 15, 1919.

Though no statement of the company's gross sales has been included in the report, the total for the year is said to have been \$35,000,000. Officers and directors were re-elected in the annual meeting and in the directors' meeting which followed it.

#### FINANCIAL STATEMENT OF THE PACKARD MOTOR CAR CO. FOR THE FISCAL YEAR ENDING AUGUST 31, 1916

ASSETS	
Plant: Real estate, buildings, equipment and machinery at cost, less depreciation.....	\$12,251,123.68
Rights, privileges, franchises and inventions.....	1.00
Inventories: Raw materials, work in process and finished vehicles.....	16,518,264.81
Stock option contracts with employees.....	138,000.00
Investments: Stocks, bonds and short time securities...	533,080.94
Current: Cash.....	1,202,730.79
Vehicles in transit to dealers covered by drafts.....	527,326.66
Accounts receivable.....	2,040,496.01
Bills receivable.....	328,788.86
Expenses paid in advance.....	104,846.04
Total assets.....	\$33,644,658.79

LIABILITIES	
Capital stock—authorized and issued Common—total outstanding 116,569 3/10 shares of \$100 each.....	\$11,656,930.00
Unissued 13,430 7/10 shares of \$100 each.....	1,343,070.00
Total authorized issue of 130,000 shares of \$100 each.....	\$13,000,000.00

Preferred—7 per cent cumulative—authorized and issue, 80,000 shares of \$100 each.....	8,000,000.00
Five per cent Gold Debenture notes due Dec. 1, 1916.....	3,000,000.00
Deferred payments on real estate purchased for retail selling agencies.....	408,985.58
Notes payable.....	1,550,000.00
Accounts payable—current invoices, accrued payroll, vouchers not due, deposits on vehicle orders.....	3,182,078.83
Reserves for general purposes.....	465,178.34
Surplus as at Aug. 31, 1915.....	\$4,617,297.93
Additions this year.....	6,206,419.61

Total surplus.....	\$10,823,717.54
Deduct dividends paid this year:	
Preferred—in cash.....	\$455,000.00
Common—in cash.....	395,601.50
Common—in stock.....	4,591,630.00
	\$5,442,231.50
Net surplus as at Aug. 31, 1916.....	\$5,381,486.04
Total liabilities.....	\$33,644,658.79



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### THE CLASS JOURNAL COMPANY

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## Prices Up

**A**LREADY we have seen a number of instances this year where manufacturers who lowered prices last year have put them back to their former level, or even made an increase over the 1916 model schedule. This was anticipated, and is the best possible thing for the industry, because many of the price cuts made last year were neither necessary nor good business.

At the end of 1914 the automobile industry was distinctly scared. It had planned great extensions and the general state of business looked bad for 1915 trade. So the price cuts were decided upon as an essential to the increase of production.

By the time factory extensions were completed and the new models and new prices were in force, amazing things had happened to the prosperity of the country and to the prices of raw materials, so that the manufacturers found that their extensions and their increased outputs were not enabling them to make cars as good as before with the same profit margin; in other words, the cuts had been made before a proper appreciation of the conditions. The industry is now repairing its mistake, seeing that it is far better to raise the price than to cut the quality. There is much more demand to-day for better cars than for cheaper ones, and there is every indication that this condition will persist for some time to come.

## Aero Caution

**T**HE fact that the U. S. government is buying aeronautic engines in some quantity and that Europe has been doing so for a long time has led certain of the leading automobile manufacturers to look into the business with respect to its possibilities. At present more than one of our foremost automobile engineers is giving the bulk of his time to aviation work, and next year will certainly see half a dozen good aeroplane motors ready for production in automobile plants.

When one automobile firm makes a break there is a strong tendency for all the rest to follow, but this is a situation where the greatest caution should be observed. Firstly, there is comparatively little money in the business. There will be no European orders after the war, and the U. S. air departments will not want engines in thousands. To produce a satisfactory aeroplane motor, not a good one but merely a satisfactory one, needs experimental work that can easily run to \$100,000 or more, so the automobile manufacturer who adds an aviation section is likely to gain more honors than riches from his venture.

There is room next year for perhaps six, perhaps a dozen, builders of good aviation engines, but it is doubtful if there will be room for many more.

## Truly Progressive Assembly

**P**ROGRESSIVE assembly is not a new thing in itself, though it is fairly new to the automobile industry which is just finding out upon how small an output it pays to install the necessary equipment, but the equipment is only half the battle. Studying the chain assembly systems which have been put in during the last year or so makes clear the fact that some have been installed and are being run "progressively," while others are not. There is a tendency noticeable in some plants to neglect the petty detail that is life or death to the efficiency of a chain assembly line.

If the operations are not divided up properly the result will be that some jobs will be done at an extravagant waste of time, while others will not be done properly owing to lack of time. Also the feeding of a chain assembly needs as much study as the assembly itself. It is little use assembling a part in 10 sec. if 5 min. are wasted in bringing it to the desired spot first. In most of the recent installations there is room for improving the supply of parts to the assembly line and in many bad work is getting past owing to an inefficient splitting up of the time into its various sections. The hospital section at the end of the line where the assembly shortcomings are corrected is often kept pretty busy, and the need for it is a confession that there is something wrong with the assembly itself. Time will effect a cure, of course, but there is at present so surprising a difference between factories that it seems insufficient knowledge is being circulated.

It will pay our manufacturers to look into this detail of operation and perhaps some changes may be made to advantage in the layout of the system.



# U R U G U A Y



One of the main streets in Montevideo, showing the double line of modern trolley cars with ample room on each side for two rows of motor traffic abreast. The streets are generally well paved. While Montevideo has several narrow Spanish type streets in the older sections of the city, there are many of these wide modern streets. The city is the great tourist center for the east coast. Because of this there are many good hotels for tourist trade, good city and beach motor drives, in fact there is no other city in South America so ambitious for automobile trade as Montevideo.

By David Beecroft

**EDITOR'S NOTE:**—This is the first of a series of articles embodying the close observations of automobile and general trade conditions in Uruguay made by Mr. Beecroft, Directing Editor of *THE AUTOMOBILE*, during a 10-weeks' trip through Argentina, Uruguay and Southern Brazil as a delegate of the United States Government and member of the Argentine Return Visit Committee. Subsequent articles will further analyze the possibilities of selling cars, trucks, tractors and accessories in Uruguay.

**A**LTHOUGH the smallest country in South America, Uruguay is of much greater importance to the motor industry than its area or its population would lead you to believe. Uruguay as a country equal in area to the six New England States, with New Jersey added, and measuring only 355 miles from north to south, occupies a position in South America similar to Belgium. As Belgium was the buffer State between Germany and France, so Uruguay is a buffer country between Brazil, to the north and east and Argentina. Brazil and Argentina are great rivals. Their navies are approximately of equal strength. When one adds a large battleship the other follows suit. They watch army figures; in fact, the development of one is always carefully watched by the other.

Uruguay, like other South American countries, is not a manufacturing country, although it is perhaps a leader in this regard. It does not manufacture anything for the automobile or motor truck business and is of interest to us only as a consumer market.

#### Car and Truck Field Small

With the population of only 1,300,000, not so much as the city of Buenos Aires alone, there is naturally a limited auto-

mobile and motor truck market. Australia has a population of 5,000,000 which is a high potential buying population. Canada has a population of 8,000,000, which is also a high potential buying population. Argentina, with a population of 8,000,000, is not so potential a buying population as Canada. Brazil with 25,000,000 has a still lower potential buying factor. It is questionable if Uruguay with its 1,300,000 has not a higher potential buying factor than any other South American country.

#### Imported 183 Cars in 1915

At present it is almost impossible to get a correct estimate on the number of automobiles in this country. The old reliable dealers differ in their estimates, and as there is no registration for the entire country, but only in departments, it is impossible to get up-to-date reports. One dealer estimates from 3500 to 3800 cars in the country. Another equally reliable dealer places the figure at 3000 to 6000. All agree that there are scarcely 100 motor trucks in the country.

During 1915 a total of 183 automobiles were imported into Uruguay, according to the figures of Herman L. Spahr, American consul at Montevideo, the capital city. In addition there were fifteen motorcycles and forty-six bicycles. Our

U. S. consular reports show that in 1914 we shipped from the U. S. A. 183 automobiles and one truck to Uruguay. The figures for 1916 are not yet available.

#### Montevideo the Center

In the capital city, Montevideo, with a population of 375,000, the automobile industry for the entire country centers. Montevideo is one of the most modern cities in South America, being the only one at present supporting a motor bus line on its city streets in addition to an up-to-date trolley system. The motor buses are similar to those operated by the Fifth Avenue Bus Co., New York City. The city of Montevideo is essentially a rolling city built on and around a series of reasonably low hills, and has an excellent water frontage on the ocean. It is 104 miles from Buenos Aires by boat.

Here in this city you find as modern automobile salesrooms, garages, etc., as in Buenos Aires, but of course on a smaller scale, much in the ratio of the population of the two cities. Here on the streets you see long lines of European cars of the closed type, the same as in all South American cities. There are rows of taxicabs along the sides of the city plazas and the streets are generally well paved. Montevideo has the advantage also, as an automobile city, of having several very modern macadam highways radiating out of the city. There is no other city in South America with the possible exception of Cordoba, in the heart of Argentina, where such excellent motoring roads exist. The national government of Uruguay has been building a series of national roads for some years and to-day Uruguay, although the smallest country in South America, has more modern automobile highways than any other country on the continent. It has more modern highways than Brazil, which in area equals the U. S. A. It has more modern highways than Argentina, which in area equals the U. S. A. east of the Mississippi River.

In Montevideo you find salesrooms just as modern in some cases as on Broadway, N. Y., or Michigan Avenue, Chicago, although not so elaborate. They remind you of the salesrooms in cities of the Mississippi Valley. Here you find such U. S. A. cars as Overland, Ford, Studebaker, Chevrolet, Hudson, Buick, Haynes, King, Scripps-Booth, Dodge, Maxwell, and others. Very frequently they are sold in salesrooms all their own, but in other cases are alongside of expensive European cars that have not been selling for 2 or 3 years.

#### Statistics Are Meager

It is almost impossible to get a definite idea of the number of different makes of U. S. A. cars that have been sold in Uruguay. A canvass of the different dealers furnished information as follows: There have been approximately 800 Fords sold in the country, and last June the local dealer in Montevideo was 7 months behind in deliveries. The Ford dealer employs two traveling men who are constantly going throughout the country. In 1915, there were 180 Fords sold, and it is expected that in 1916, some 280 or 300 will be marketed in that country. In addition to the head office in Montevideo there are nine Ford sub-dealers throughout the country. Over 90 per cent of the Fords are sold in the country districts.

Studebaker has perhaps one of the best salesrooms in Montevideo and from it the entire country is served. Upward of 100 Studebakers were reported in Uruguay in June. Seventy-five per cent of these have been sold to the farmers, or camp people as they term them in Uruguay. In addition to the Montevideo salesroom there are ten other Studebaker dealers throughout the country.

Reports show approximately 75 Buicks in Uruguay and two dealers in addition to the representation in Montevideo. Over 75 per cent of the Buicks have been sold in the camp, or country.

Information which was collected in the circuit of the deal-

ers at Montevideo estimated the following numbers of other cars in the country: Chevrolets, forty-six; King, eight; Pierce, four; Haynes, five; R. C. H., six; Case, fifteen; Overland, 100; and Dodge, twenty-five. There were other makes on which it was impossible to get figures.

#### Camp the Main Market

It is the general consensus of opinion that the great percentage of U. S. A. automobiles will have to be sold in the camp. Dealers agree that over 75 per cent are already sold in the camps and that the cities of which there are very few outside of Montevideo are stocked with European cars. The development of the U. S. A. automobile in Uruguay is thus destined to follow the same lines of introduction as in Argentina, Brazil, and other South American countries, namely, from the country or camp to the city.

The country of Uruguay is essentially a rolling pampa, almost treeless. It is not level like Argentina, but constantly rolling and getting rugged as the northern part is approached. The country lacks population, as the figures of 1,300,000 for a territory as large as New England with New Jersey added, would indicate. Naturally the population centers around the south and up the west coast along the Parana River. In the country are 25,000 estancieros or farmers. It is to this class that the Montevideo dealers are selling automobiles to-day. These estancieros make Montevideo their business headquarters, which naturally allows the automobile dealers an opportunity of demonstrating their cars and closing sales. When the car is delivered the dealer sends a driver to make delivery to the home of the estanciero. It may require 1 or 2 days to reach his home, as the roads are deplorable in wet weather when you get off the modern system of highways radiating out of the capital.

#### 500 Cars in Soriano

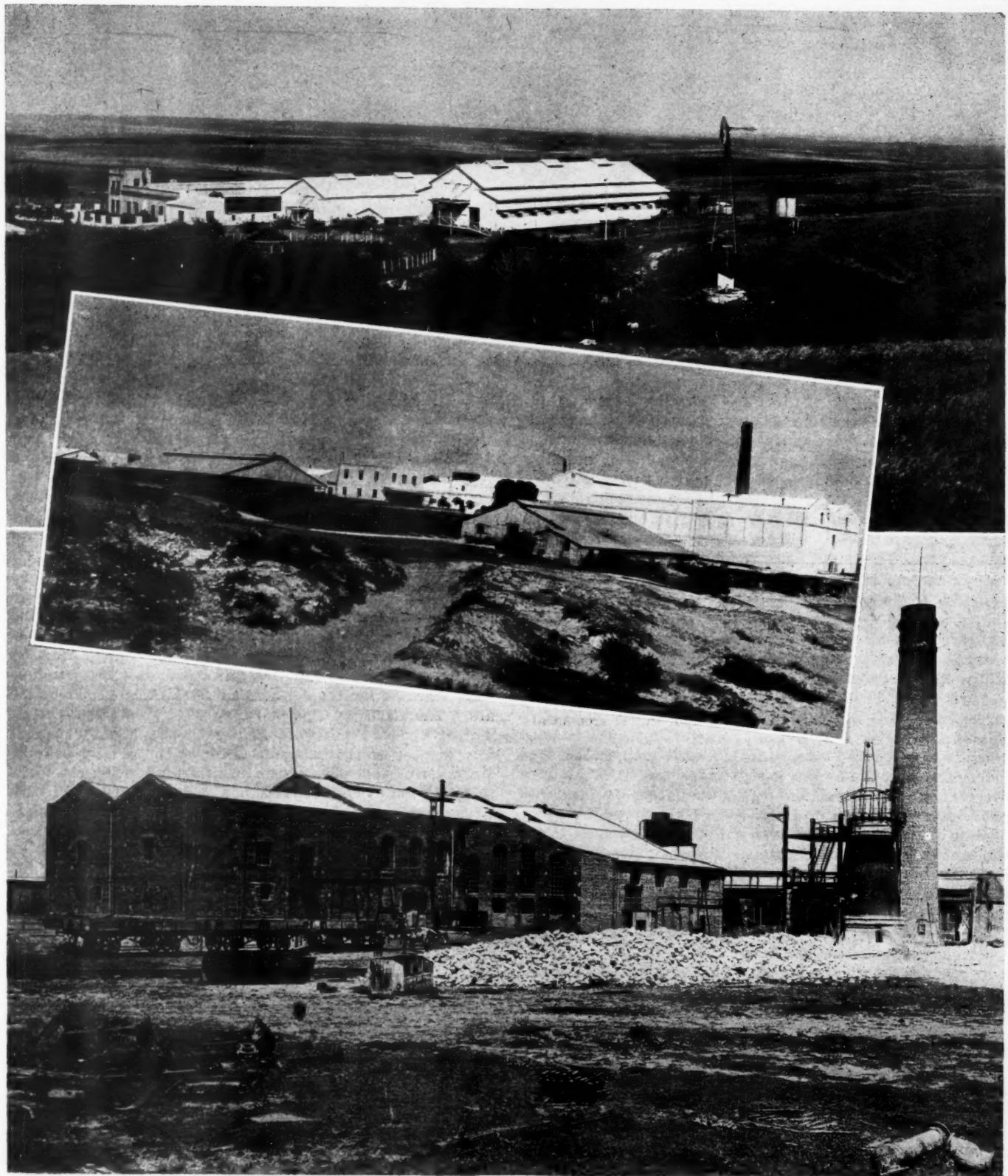
There are several departments, or we might call them States, in Uruguay, which are good purchasers of automobiles. One of the richest of these is Soriano, the capital of which is Mercedes. It is estimated that there are 500 cars in this department. The department of Salto, further north, has 250 cars. These are the two most important departments, but in the others there is a good scattering of motor cars. The buying population of these interior towns and cities can scarcely be estimated from population figures. Very frequently the majority of the wealthy farmers will live in these cities, thus greatly increasing their potential buying capacity. The population of some of the cities of the country follows:

Paysandu .....	35,000
Mercedes .....	25,000
Salto .....	25,000
Fray Bentos .....	15,000
Rivera .....	10,000
Guadalupe .....	10,000
Minas .....	10,000
Florida .....	10,000
Colonia .....	10,000

The people of Uruguay look favorably upon the U. S. A. automobile industry largely because a good deal of U. S. A. money is being invested in the country and also because large U. S. A. firms are fulfilling contracts of one nature or another in Uruguay. This work has naturally been facilitated by a branch of the National City Bank in Montevideo. This bank contains a large credit department, as do the other branches of this bank in South America. U. S. A. automobile manufacturers can get any information desired regarding credit of dealers or others through this bank. The manager hails from Texas and has had years of experience in U. S. A. and is consequently well qualified to give whatever information the automobile manufacturer requires. He has been particularly active in interesting Montevideo dealers in U. S. A. automobiles and one of the recent agencies which he was directly responsible for negotiating is proving very successful. The bank is interested in this work and the



## Glimpses of Farm and Factory in Uruguay



Upper—General view of the treeless pampas which stretch for miles upon miles of rolling country in Uruguay. The large estancia or farmhouse in the foreground is the property of a French company. This view is taken in Florida, one of the states in Uruguay

Middle—One of the large packing houses in Montevideo, the capital city of the Republic of Uruguay. Establishments such as this are operated by Swift or Morris & Co. and other big packing firms

Lower—View of the sugar factory of La Sierra, one of the leading industries in the State of Maldonado, one of the departments, or states, of Uruguay. Note the peculiar flat cars on the railroad siding



General view of country adjacent to Montevideo, Uruguay. It is essentially rolling and treeless in a large percentage. Naturally, where settlements have been made trees have been planted, which give the country an attractive appearance. The home of the estanciero is shown, but unfortunately for each estanciero there are scores of mud huts the same as in Argentina.

manufacturers should not hesitate getting all information desired.

Several large U. S. A. firms are operating in Montevideo. McArthur Bros., large railroad construction people, have \$12,000,000 contracts. The Uhlen Co. is doing much municipal improvement work in Paysandu, Mercedes, Salto, and other interior cities. Other firms have similar construction work. In Montevideo are large packing houses, one controlled by Swift of Chicago, and the other by Morris and Armour interests. Thus U. S. A. manufacturers are not foreign to Uruguayans. They are already familiar with our large corporations and our methods of doing business.

In the accessory field the business in Uruguay is largely the same as in any other South American country. Where our cars are sold there is a demand for accessories. Montevideo has one very large modern accessory and supply house which distributes to the entire country. In addition the garages carry lines of accessories, parts, etc., much as in Argentina and Brazil. Our largest tire concerns are nearly all represented in Montevideo. Some of them are handled through agencies and others through dealers appointed from Buenos Aires. There is a good demand for U. S. A. tires, largely due to the inability to get tires from Europe, with the possible exception of Italy.

High freight rates constitute one of the drawbacks to the automobile business in Uruguay. Freight rates from New York to Montevideo are practically the same as from New York to Buenos Aires. In June it was costing \$130 ocean freight from New York to Montevideo on a Ford. Some of the Chevrolets were shipped at \$1.05 per cubic foot. It was costing \$200 to send an Overland Model 75 from Toledo to Montevideo.

Because of these high freight rates, to which must be added the import tax 31 per cent ad valorem prices on cars are much higher than in U. S. A. The Ford sells for \$850, Uruguay currency. Uruguay is the only country in South America where a dollar is worth less than the U. S. A. dollar. They will only allow you approximately 95 cents Uruguay coin for a U. S. A. dollar, so that the price of \$850 means considerably more in our currency.

The duty on tires entering Uruguay is largely based on tire value. Thus a tire is valued at \$10 and the duty is \$4.50 U. S. A. gold. A tube is valued at \$5 and pays a duty of 45 per cent, which is \$2.25 U. S. A. gold. A steel-studded tire is valued at \$15 and paying a 45 per cent duty means \$6.75 U. S. A. gold duty. There is no duty on tires shipped into the country on a car, so naturally all Montevideo dealers purchase cars equipped with a set of five tires. Tire chains are used in Montevideo much the same as in any U. S. A. city.

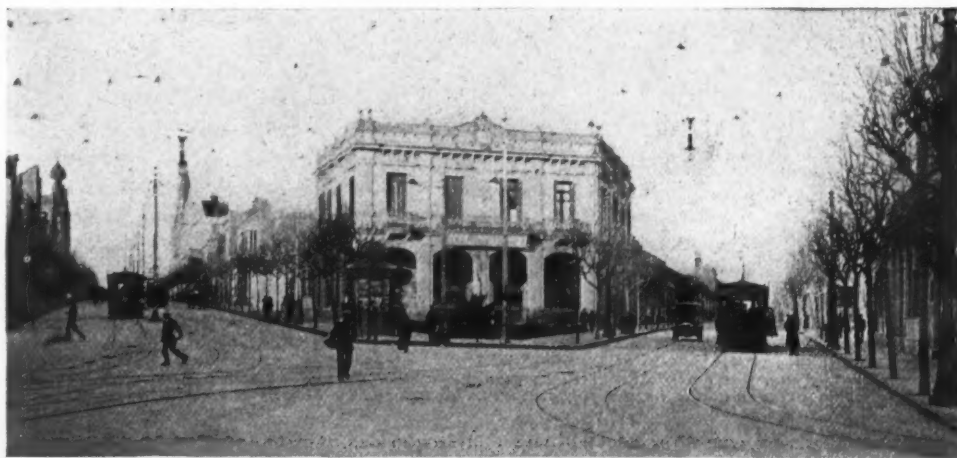
#### Uruguay's Highways

Uruguay aims to be the leading pleasure-ground for the countries of South America and with that end in view has given great attention to the development of its roads.

These ambitions are not day-dreams, and they are fast becoming realities. To-day Uruguay has more improved highways for motoring than Argentina, Brazil, Chile or any other South American country. So far is her great dream of being the Riviera beneath the Southern Cross already realized. The wealthy Argentines ship their motor cars by boats, a night's trip of 90 miles, from Buenos Aires to Montevideo to enjoy the fine system of roads now under construction by the Uruguayan national government. Brazil's wealth also seeks the highways of Uruguay for recreation and motoring joys.

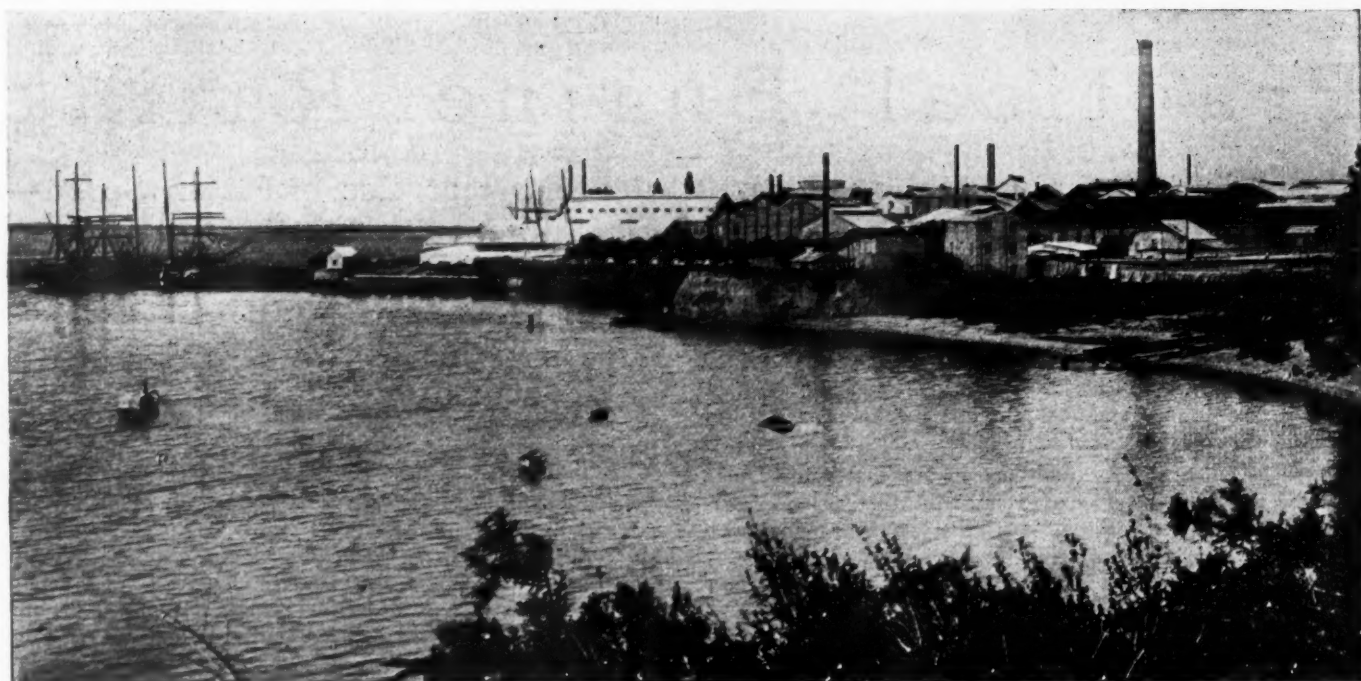
Further details of Uruguay's highway development will be taken up in a future issue.

(To be continued)



A semi-suburban street corner in Montevideo, showing how the wide modern street movement has permeated the city. These streets are ideal for passenger and truck traffic.





One of the large packing houses of Uruguay. This is Liebig's establishment in Fray Bentos, in the State of Rio Negro

## S. A. E. Standards Committee Widens Scope

**T**HE meeting of the Standards Committee at Washington last week seems, when its results are analyzed, to have added very little to the recommended practice of the society. This undoubtedly is correct, but there are a number of very vital subjects which have previously been matters for very vigorous discussion and which are now brought for the first time within definite sight of final agreement.

### A Trial Scheduled

The first of these is the fuel economy and acceleration testing schedule on which the research division has been working for nearly 2 years. This has been before the committee many times and has constantly been referred back to the division. It has now been provisionally accepted by the committee and a trial is to be made on the Sheepshead Bay speedway to check up the working of the system, so that the absolutely final documents may be placed before the winter meeting of the society.

The research division also reported that it had reached the conclusion that no simple formula for stating the ability of a car in mathematical terms could be devised, owing to the very large number of factors which enter into and affect the indefinable thing usually described as car performance. While a formula can deal with piston displacement, gear ratio, etc., it cannot express the delicacy of the springs, softness of the upholstery or the easy control which, together with many other similar matters, are of great importance in giving a car its character.

The acceptance of the testing form in January will clean the slate of the research division which will then have nothing left before it until some new assignment is made by the Council.

### Aeroplanes Not Easy to Standardize

With Henry Souther as its chairman, a good deal of activity was naturally expected from the aeronautical division. This presented a report and suggested the fact that this division had done more actual work during the Summer months than any other committee.

The aeronautic position is a somewhat peculiar one because the science of aeroplanes and aeroplane engine building is de-

veloping so rapidly that some new thing appears every day. This means that if any standards adopted in the light of the best knowledge which we possess to-day, then 6 months hence we may find it essential to change those standards. On the other hand, the need of standards is very great. One of the speakers in the discussion said there were in Europe as many different methods of attaching propellers to their hubs as there had been chief engineers in the outgoing industry. The adoption of the standard hub and propeller mounting will mean that the U. S. Government will order its supplies accordingly. This will mean that everyone doing government work will use the S. A. E. standard hub, and if any change is found desirable 6 months or a year hence everyone will have to change and the inconvenience will be no greater for one manufacturer than for another.

Supposing two different standards are used during a single year. At the end of that year the government will have to carry stock for the old and the new standard. In other words, for two series of sizes, probably about six sizes in all. If, on the other hand, they use no standard at the end of the year they may have to carry sixty sizes or more. Thus it is obvious that it is well worth while setting up a standard even if this be in use only for a brief time.

### Truck Standards Valuable

Regarding the military truck specifications on which the truck standards division is working, the situation is extremely satisfactory. The quartermaster's department of the army is engaged upon an examination of the evidence derived from the trucks in use on the border and from some informal discussions which took place during the Washington meeting, it is obvious that the work of the truck standards division is going to be very valuable. There is some need for speed, and it is hoped that the S. A. E. ideal specification may be agreed upon completely during the Winter.

With the establishment of a special small committee to deal with, the electrical equipment division has one of the most troublesome subjects taken from its program, although this still leaves it plenty to do. The elaboration of the generator and starting motor mounting standards is the principal item. This should be in final form by January.

# Practical Engine Rating

Errors in Developing Rating Formula and Incorrect Use of Piston Speed—  
Variation in Power Efficiency with Different Sized Cylinders\*

By Edward G. Ingram

**A**LMOST from the birth of the automobile industry the development of a suitable horsepower rating formula has been a subject of discussion, though of late it has not received so much attention.

One of the first real investigations on this subject was made by the horsepower committee of the Institution of Automobile Engineers, in Great Britain, yet the results were not satisfactory. The committee set out to find a formula that would give the approximate horsepower of engines from a knowledge of the bore, stroke and number of cylinders. For obvious reasons, nothing more than a general idea of the horsepower that various makes of engines will develop can be obtained from these dimensions alone, but the error that the committee made in deriving a formula was that it attempted to make use of piston speed instead of the frequency ("speed") of revolution. It is practically impossible to use piston speed in developing a rating formula, for several reasons.

## Piston Speed Wrong Basis

To illustrate why this is, let it be assumed temporarily that all engines have the same volumetric and thermal efficiency. Then maximum power will be obtained at the same number of revolutions per minute in all cases, no matter what the stroke-bore ratio or piston displacement of the engine may be. Under the same conditions, however, the piston speed at maximum power will not be the same for two reasons:

1. Because in engines of the same piston displacement the piston speed will vary with the stroke-bore ratio.
2. Because even if all engines had the same stroke-bore ratio the piston speed would vary with the displacement, or in other words the size, of the engine in each case.

Of course, actually, the thermal and volumetric efficiency will vary considerably with the design of the engine and this will cause some variation in the revolutions per minute at maximum power, and a further variation in the piston speed. However, since but two factors affect revolutions per minute while four affect the piston speed, it is obvious that the speed of revolution and not the linear piston speed should be considered in developing a horsepower formula.

The brake horsepower of a four-cycle engine in terms of

the revolutions per minute is equal to the following value:

$$(1) \quad \frac{N n \pi b^2 l \eta p}{3,168,000}$$

Where  $N$  equals the number of cylinders,  
 $n$  " " revolutions per minute  
 $b$  " " bore  
 $l$  " " stroke

Where  $\eta$  equals the mechanical efficiency,  
 $p$  " " m. e. p.

Here  $n$ ,  $\eta$  and  $p$  are the unknown quantities, approximate values for which must be determined by obtaining the average figures from the performance of actual engines.

The linear piston speed  $s$  equals

$$\frac{2 n l}{12} = \frac{n l}{6} \text{ feet per minute}$$

Substituting this value in (1) and incorporating the value of  $\pi$  in the constant, the brake horsepower in terms of the piston speed is

$$(2) \quad \frac{N s b^2 \eta p}{168,000}$$

This second formula was the one used by the British horsepower committee in their investigation. It necessitated the determination of the piston-speed in ft. per min. at maximum output instead of the r. p. m. While the formula is satisfactory when the piston speed is already known, as in the case of an engine under actual test, it is practically useless where the piston speed is unknown and must be determined for engines of various displacements and stroke-bore ratios.

In its attempt to find the piston speed at maximum power of engines of different stroke-bore ratio, the British

Committee made tests on 101 engines, after which it decided that it would be represented by the equation  $s = 600 (r + 1)$  feet per minute, which gives a piston speed of 1200 ft. per minute when  $r = 1$ , and 1800 feet per minute when  $r = 2$ . This was a most remarkable decision because the formula gives excessively different speeds of revolutions to engines having the same stroke-bore ratio but different displacements.

For example, a 3 by 3-in. engine according to this formula would develop its maximum power at 2400 r. p. m. while a 6 by 6-in. engine would reach maximum power at 1200 r. p. m. Again, assuming equal efficiency in engines of the same displacement, maximum power should be reached at the same

TABLE I—STANDARD CAR ENGINES

Engine	Bore and Stroke	Max. Hp.	R.p.m.	Piston Per Disp.	Disp. Cu. In.	Hp. Per Cu. In.
Mercer, 4*	3 3/4 x 6 3/4	87.	2,020	298	74.5	.292
Continental, 4*	2 3/4 x 4	25.7	2,700	95	23.7	.271
Hudson, 6*	3 1/2 x 5	77.	2,500	289	48.1	.267
Stearns-Knight, 4*	3 3/4 x 5 3/4	60.	2,400	248	62.1	.242
Herrmann, 8*	2 1/2 x 4	37.	2,350	157	19.6	.234
National, 12	2 3/4 x 4 3/4	77.5	2,900	338	28.2	.229
Ferro, 8	3 1/4 x 4	60.7	2,300	266	33.2	.228
Packard, 12*	3 x 5	93.	2,760	424	35.3	.220
Marmon, 6*	3 3/4 x 5 1/4	73.	2,450	340	56.6	.215
Cole, 8	3 1/2 x 4 1/2	73.	2,800	346	43.2	.211
Moline-Knight, 4*	3 1/2 x 5	40.4	2,100	192	48.1	.210
Willys-Knight, 4*	4 1/4 x 4 1/2	50.5	1,950	240	60.1	.210
Moon, 6	3 1/2 x 5 1/4	62.	2,080	303	50.5	.204
Le Roi, 4	3 1/4 x 4 1/2	28.	2,250	138	34.5	.203
Chalmers, 6	3 1/4 x 4 1/2	45.	2,600	224	37.3	.201
Universal, 4*	2 1/2 x 3 1/2	14.	3,250	69	17.2	.199
Moon, 6	3 1/4 x 4 1/2	44.	2,360	224	37.3	.196
Crane-Simplex, 6	5 3/8 x 6 1/2	110.	....	563	93.9	.195
Overland, 4	3 1/4 x 5	29.5	2,120	153	38.3	.193
Cadillac, 8*	3 1/4 x 5 1/4	60.	2,400*	314	39.3	.191
Simplex, 4*	5 3/8 x 6 1/2	108.	1,800	590	147.5	.183
National, 6	3 1/2 x 5 1/4	55.	2,000	303	50.5	.182
Simplex, 4	4 1/4 x 6 1/2	85.	1,800	486	124.4	.174
Locomobile, 6*	4 1/2 x 5 1/2	82.	1,800	525	87.5	.156
Locomobile, 6	4 1/4 x 5	66.	1,740	475	70.9	.155
Pierce-Arrow, 6	5 x 7	120.	1,600	824	137.4	.146
Continental, 6*	4 1/4 x 5 1/4	40.	1,600	280	70.1	.143

\*Shown in Fig. 1.

\*The curves and figures illustrated and mentioned in this article have been taken from data published from time to time and do not necessarily refer to the latest models of the various makes.



number of r. p. m. no matter what the stroke-bore ratio, yet the piston speed given by the formula will give different speeds of revolution with engines of different stroke-bore ratios.

#### Effect of Cylinder Size

Because small cylinders have a greater proportion of cylinder surface to volume than large cylinders, resulting in greater heat losses through the water jacket, the British committee decided that the m. e. p. would vary with the size of the cylinder. It has since been shown, however, that in practice this is to a great extent made up for by the use of a higher compression in engines with small cylinders, so that the average m. e. p. is more nearly the same for cylinders of all sizes. One reason the committee went astray on the question was because in making tests they considered the variation in m. e. p. with relation to the bore instead of the piston displacement.

It is obvious therefore that, if the average number of r. p. m. had been considered instead of the piston speed and, if the average m. e. p. with relation to the piston displacement had been determined, the committee would have obtained a much more satisfactory formula than the one arrived at, which was,

$$\text{Brake Horsepower} = 0.45(b - 1.18)(1 + b)$$

It would appear, however, that a great deal of unnecessary labor is gone through in trying to develop a horsepower

TABLE II—RACING CAR ENGINES

Engine (all fours)	Bore and Stroke	Max. Hp.	R.p.m.	Pis- ton Disp.	Hp. Per Cu. In. of Disp.
1914 Peugeot*	3 1/16 x 6 1/4	92	2,870	183	45.7
1913 Talbot*	4 x 5 1/2	133	3,750	276	69.1
1915 Stutz*	3 13/16 x 6 1/2	131	2,950	297	74.2
1914 Mercedes	3 11/16 x 6 5/16	115	3,000	271	67.7
1911 Austin*	3 1/2 x 4 1/2	72	3,000	172	43.
1913 Knight*	2 15/16 x 4 1/2	50	3,000	123	30.7
1913 Deltal*	4 x 5 15/16	120	3,200	300	75.
1912 Peugeot..	4 5/16 x 7 13/16	175	2,200	456	114.
1913 Delage...	4 1/4 x 7 1/16	120	1,850	374	93.5
Blitzen Benz*	7 9/32 x 7 7/8	225	1,575	1,310	327.5

\*Shown in Fig. 4.

rating formula by making use of the formula for obtaining the brake horsepower of an engine under actual test, and then attempting to arrive at average figures for the unknown factors such as the m.e.p. and r.p.m.

#### Average Power

Just as satisfactory results can be obtained by finding the horsepower that the average engine may be expected to develop per cubic inch of piston displacement.

The only thing that then enters into the question is whether engines with small cylinders will develop the same horsepower per cubic inch of displacement as engines with large cylinders. Experience in both the standard and racing car field indicates that the small cylinder engine is more efficient and will develop a higher amount of horsepower per cubic inch of displacement. This probably can be explained by the fact that while the thermal efficiency of a small cylinder may be lower, even with the use of a higher compression, this is more than offset by the fact that much greater valve area with relation to the displacement can be obtained, resulting in a higher volumetric efficiency. Increased volumetric efficiency means not only a higher speed of revolution, but also a higher m. e. p. at a given number of r. p. m.

To give some idea of the brake horsepower per cubic inch of displacement, which standard engines of up-to-date design will develop, Table I has been compiled, and in Fig. 1

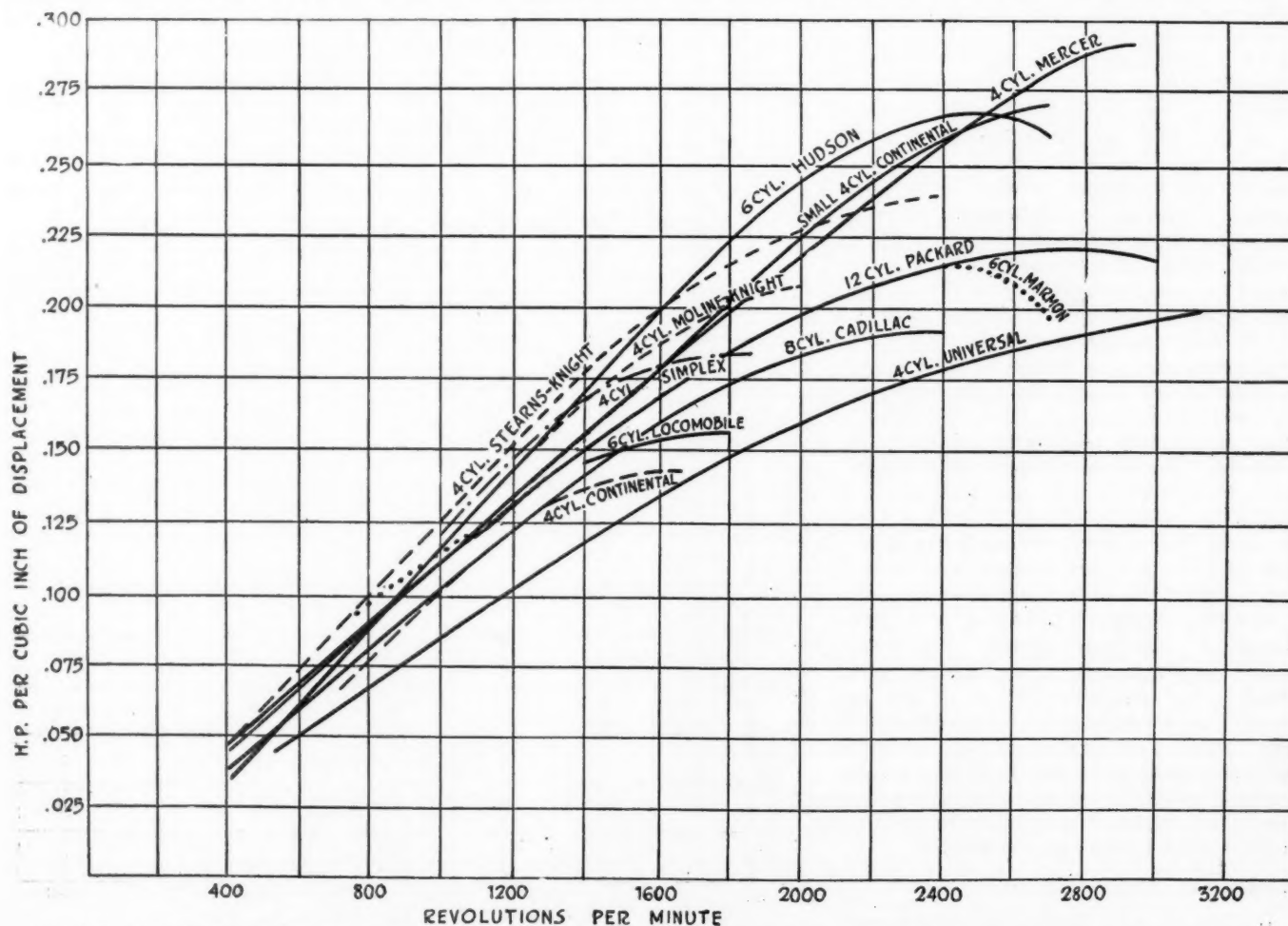


Fig. 1—Curves showing the horsepower per cubic inch of displacement at various speeds of several makes of stock car engines

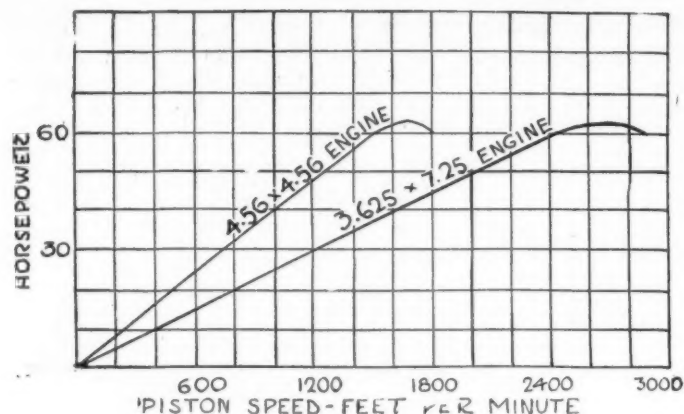


Fig. 2—Imaginary power curves plotted against piston speed

are shown power curves of some of these engines, plotted on the basis of horsepower per cubic inch of piston displacement. Outside of their value in determining a means of rating engines the figures are interesting, for this also is about the only satisfactory way of obtaining an idea of the relative power efficiency of engines of different displacements. The curves show not only the relative efficiency at maximum output but also at lower engine speeds.

It must be remembered, however, that because one make of engine is more efficient than another this does not mean necessarily that the performance of the car in which it is used will be better, since this depends upon the total displacement of the engine, weight of the car and many other considerations. Some designers prefer to use large slow-speed engines of relatively low efficiency instead of the high-speed type.

In speaking of power curves attention here may be called to the fact that it is much better to plot the horsepower against r. p. m. instead of against piston speed in feet per minute. For example in Fig. 2 is shown imaginary power curves of two engines of the same displacement but with different stroke-bore ratios plotted against piston speed. The engines are assumed to be of the same general construction so that the power developed will be essentially the same at any given number of r. p. m. up to the maximum. At any point where both engines are developing the same amount of power the piston speed will be different, so that the curves will never coincide. If, however, the curves are plotted against r. p. m. one curve will represent both engines, as shown in Fig. 3.

If the two engines were placed in identical cars, the same gear ratio should be used for both and the cars would make the same number of m. p. h. when the engines were developing the same power. The piston speed, however, would bear no direct relation to the engine output or to the car speed but would depend upon the stroke-bore ratio. Comparing engines on the basis of horsepower per cubic inch of displacement is really the same as considering each to be of the same total displacement no matter what is the real displacement.

#### Comparing Different Engines

In looking over Table I and the power curves in Fig. 1 the first thing to attract

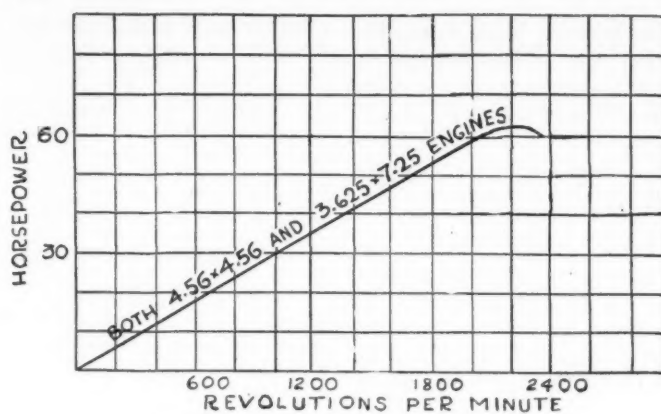


Fig. 3—Curve of engines in Fig. 2 plotted against r.p.m.

attention is the wide variation in the power per cubic inch of displacement developed by various makes of engines. The highest curve is that of a four-cylinder Mercer. This engine develops 0.292 hp. per cubic inch of displacement, which is over twice as much as that developed by the four-cylinder slow speed Continental engine, the curve of which is the lowest of all. The displacement per cylinder of these engines is 74.5 cu. in. and 70.1 cu. in. respectively.

Next to the Mercer in power efficiency comes a small high-

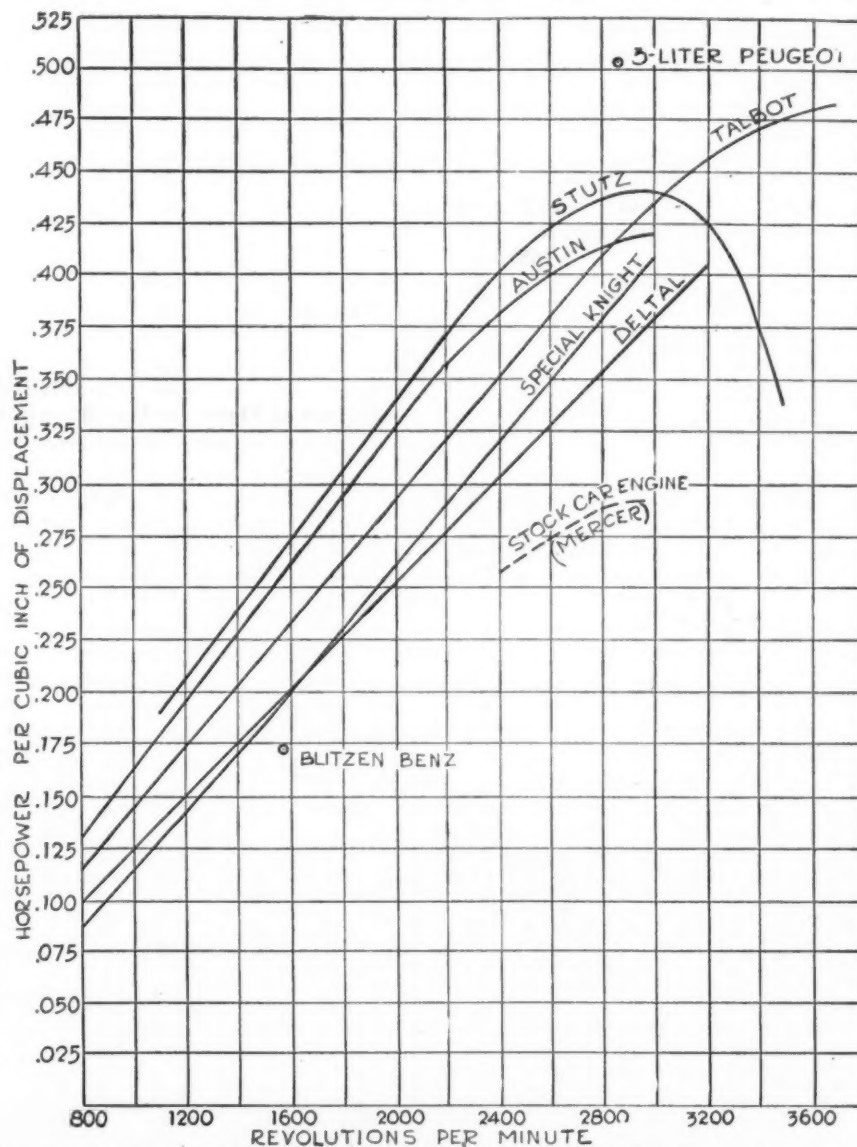


Fig. 4—Curves showing the horsepower per cubic inch of displacement at various speeds of several makes of racing car engines



speed Continental engine with a displacement per cylinder of only 23.7 cu. in., and closely following this comes the Hudson super-six engine with cylinders of 48.1 cu. in. displacement. Even though there is considerable variation in the power efficiency of engines of about the same displacement per cylinder, due to variations in design, still the tendency for engines with large cylinders to be less efficient is shown, though it is more marked in the case of cylinders of over 74 cu. in. displacement.

The large Simplex engine, for example, with a displacement per cylinder of 147.8 cu. in. is designed along very efficient lines yet its power per cu. in. of displacement is only 0.183. The average hp. per cu. in. of displacement developed by the eleven engines in Table I with cylinders of under 40 cu. in. displacement is 0.215, while the five engines with cylinders of over 80 cu. in. displacement show an average power efficiency of only 0.171.

While engines with large cylinders are less efficient at high speeds of revolution, there appears to be a tendency for them to be more efficient at low speeds. For example the Simplex curve is the highest of any of the poppet valve engine curves at 1000 r. p. m., while the curve of the little Universal engine with cylinders of only 17.2 cu. in. displacement is the lowest at this speed. Its maximum power efficiency, however, is higher than that of the Simplex engine. This tendency for large cylinders to be more efficient at low speeds of revolution may be due to the better thermal efficiency already spoken of, though just why this should be more apparent at low speeds is not altogether clear.

There is apparently a tendency for the small cylinder engine to develop maximum power at a very high speed of revolutions. The little Universal engine, for example, gives its maximum output at 3200 r. p. m., while the large Simplex engine develops maximum power at about 1800 r. p. m. Most of the other small cylinder engines develop maximum power at high rotative speeds. This seems consistent since the small cylinder is better off with regard to volumetric efficiency. The average number of r. p. m. for the engines in Table I with cylinders under 40 cu. in. displacement is 2545, and for engines over 80 cu. in. 1800.

#### Knight Engine Characteristics

A characteristic of the Knight stock car engines is high-power efficiency at low revolution speed even where the cylinders are small. The Moline-Knight curve is higher than most others at 1000 r. p. m. though the displacement per cylinder is only 48.1 cu. in. The curve of the Stearns-Knight is the highest of all at 1000 r. p. m. Maximum power also is reached at rather low speed compared to the poppet-valve engines. This may be due partly to higher thermal efficiency and partly to better volumetric efficiency within the engines' speed range. Of course, none of these tendencies always hold good, but this hardly is to be expected considering the many variations in individual engine design. For instance, both the Mercer and Hudson companies have been prominent in racing and have developed their stock car engines along exceptionally efficient lines. The power developed by these two engines therefore is abnormally high. Variations in valve timing undoubtedly make comparisons of the different makes of engines much more difficult. The Hudson curve, for example, is remarkably high at high speeds of revolution and quite low at low speeds. This probably indicates that the valve timing is such as to favor high maximum revolutions at the expense of a slight loss in efficiency at low speeds.

Much more convincing evidence of the fact that small cylinder engines show higher power per cubic inch of displacement is to be found in an investigation of racing car engines. This is because maximum power always is aimed at in racing practice while other considerations affect the design of standard car engines. In Table II is given the power

efficiency of some typical racing engines of various cylinder sizes, and in Fig. 4 are shown power curves of some of these engines plotted on the basis of horsepower per cu. in. of displacement.

At the head of the table is the 3-liter Peugeot engine, which is probably the most efficient engine yet produced, its output being over 0.5 hp. per cu. in. of displacement. The cylinders of this engine have a displacement of 45.7 cu. in., and comparing this with the large Peugeot engine, which has cylinders with a displacement of 114 cu. in., it will be seen that the output of the larger engine is only 0.384 hp. per cu. in., that is the smaller engine is about 31 per cent more efficient. This comparison is particularly satisfactory because the two engines are of almost identical design throughout, both having four overhead valves per cylinder.

Perhaps even more convincing is a comparison of the 3-liter Peugeot engine with the huge engine of the Blitzen Benz. The Benz engine has cylinders with a displacement of 327.5 cu. in., and is built along very efficient lines, yet its output is only 0.183 hp. per cubic inch of displacement, which is lower than many touring car engines and only about one-third that of the 3-liter Peugeot. Maximum power is developed by the little Peugeot at 2870 r. p. m. and by the Benz at only 1575 r. p. m. A remarkable curve is that of the Talbot engine, which is of L-head construction with but two valves per cylinder. The cylinders have a displacement of 69.1 cu. in. and the hp. per cu. in. of displacement is 0.482, which is very high indeed.

To determine the variation in the power per cu. in. of displacement developed by engines with different sized cylinders would require extensive tests made on engines of otherwise similar design, and would tend toward a more complicated rating formula. Also while the variation is considerable in the case of racing car engines of widely different cylinder sizes, it is not so great in stock car engines, being less in fact than that due to differences in individual design. A very fair idea of the maximum power developed by the average touring car engine of to-day can be obtained by multiplying the total piston displacement by 0.17. True, many efficient small cylinder engines will give much greater power than this while very large cylinder engines or engines of inefficient construction may fall below this output; but the rule will give much more satisfactory results than those obtained from the rating formula now in general use.

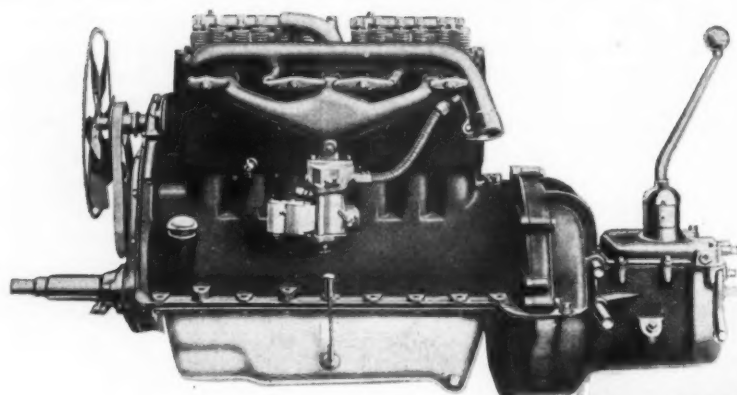
#### Valve Sizes Need Definition

FOR the past few years the magic words, "big valves," have been used as an attractive bait by the car salesman among his array of talking points. In fact, the words have not been infrequent at engineering discussions, and furthermore, since they deal with one of the developments of modern engines, it would be very advisable if they were made a little more clear. The way matters are at present when the engine manufacturer states that his valves have a diameter of a certain number of inches, no one can be quite certain as to what is meant.

In the first place the so-called in-the-clear dimension means nothing unless the diameter of the valve stem is also given, as naturally it is only a matter of clear area. It would be far more to the point to give the area with the section area of the stem subtracted, as then a clear basis of comparison is given.

The class of purchasers of automobiles who are sufficiently educated to go into such technical points as valve sizes certainly is increasing. It therefore becomes increasingly necessary to make the information clear and definite instead of misleading. Information of this kind should be given correctly or not at all, and, as it is important and worth giving, a standard should be fixed so that a valve dimension will mean a definite thing applicable to all engines.

# New Oakland Is More Powerful



Left side of new Oakland 34 engine, showing mounting of carburetor

**B**Y the substitution of a new body and a number of detailed mechanical changes the Oakland car for 1917 is made a roomier, easier riding and more powerful vehicle than its predecessors. Owing to the new body, the appearance is changed to a large extent and immediately gives the impression of being a much larger car throughout.

It is difficult to compare the present body with that of the 1916 model as the shape has been materially altered. It is 6 in. longer and of this, 5 in. has been taken up by increasing the depth of the tonneau and the other inch in enlarging the front compartment. In addition to the body change, the radiator is entirely new, being made with a deeper shell and a flat instead of a rounded front, so that although a number of indefinable features immediately proclaim the car to be an Oakland, the general appearance is in many respects different. The present model is known as the 34, and it is a refined and enlarged continuation of model 32. Model 50, the eight-cylinder car, is continued without change.

## 4 In. More Overhang in Rear

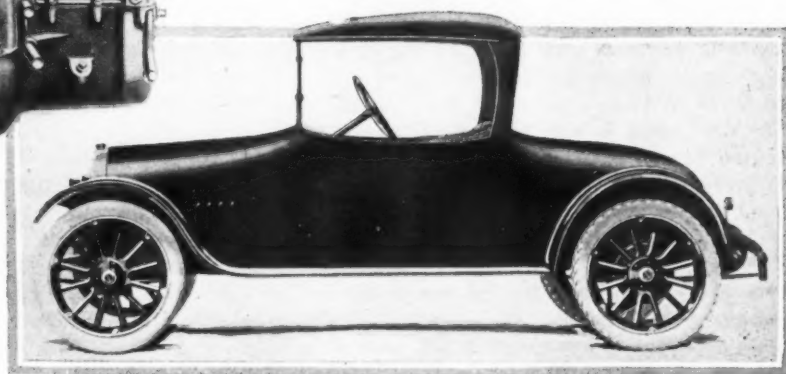
Although 6 in. has been added to the body, the wheelbase has been increased but 2 in., from 110 to 112, and the additional body space has been secured by giving 4 in. more overhang in the rear. To take care of the large proportions, 32 by 4 tires are now fitted all around in place of 32 by 3½, although, as far as the weight of the car is concerned, the 3½ size is sufficient, thus giving an over-tired car. This should make for tire economy.

Easier riding has been secured through an alteration of the spring suspension. The rear springs are now semi-elliptic in place of the three-quarter-elliptic and are 51 in. in length, whereas the three-quarter-elliptic had a length of 40 in. In changing the spring suspension, the use of Hotchkiss drive has been continued. Another factor in the easy riding qualities is the improved upholstery which is now finished in plaited instead of tufted leather, besides being better sprung.

## Power Development Increased 6 Hp.

More power has been given the car by making a series of small changes in the engine, while not altering its dimensions. Actually, an increase of 6 hp. has been obtained and the principal difference is in a re-arrangement of the valve timing and the use of an offset fulcrum on the valve rocker. This now gives a reduction of 2 to 1, whereas with the former arrangement a 1 to 1 rocker was employed. The practical

Engine Output Increased 6 Hp.  
Without Changing Cylinder Dimensions—Body 6 In. Longer  
—Eight Continued Unchanged



The new Oakland coupé with the side panels removed

result of this is that the cams give a longer dwell or open period of the valve, and this, taken in conjunction with the new timing, gives a higher volumetric efficiency and hence the gain in power. The engine output is now 41 brake horsepower at 2500 r.p.m. on the block. The only other change in the engine has been the employment of a Fabroil gear in the timing set. This is a compressed cloth gear of pronounced non-resonant qualities.

## Axle Ratio Now 4.5 to 1

Structurally, the chassis is the same as it was a year ago, the only change in the running gear being in the wheels. There is a change in the drive, however, which is of a minor nature, and that is the substitution of another make of universal of the four-block type for that previously employed, and a change in the rear axle ratio, making it 4.5 to 1 in place of 4.25 to 1.

A number of improvements have been made in the equipment. The driver's comfort has been considered in the windshield, which is now an over-lapping type, so that the rain cannot blow through the juncture point of the two glasses. The top now carries a side curtain and pockets, and a little feature which may prove of great value in conserving the car is a connection of the dash lamp with the oiling regulation. By this arrangement the dash lamp acts as a pilot light and burns continuously while the motor is running so long as there is oil in the crankcase. As soon as the supply of oil ceases the lamp goes out.

Perhaps the most striking change in the car, since it is contrary to the trend of the past few years, is the placing of the spare tire carrier in the left front fender. This has been done for the sake of rigidity as it puts a solid supporting platform beneath the tire. It has been moved forward to such an extent that it does not interfere with the left entrance.

## Engine Is 2 13/16 by 4 ¼

The power plant is an Oakland-Northway product of the overhead-valve, detachable cylinder head design. It has a bore of 2 13/16 and a stroke of 4 ¼ in. The six cylinders are



cast in a single block and the entire cylinder head carrying the valve action is removable as a unit. In fact, the engine is accessible to a high degree, as the overhead casting permits of reaching the valves and combustion chambers while the removal of the bottom pan allows the main bearings and connecting-rods to be inspected.

Cast-iron pistons are employed and these carry three rings, all above the wristpin. The valve mechanism is actuated from a single camshaft with the lifter rods on the exterior at the right side of the engine. These operate the valve rockers directly on a 1 to 2 ratio so that the lift of the cam is doubled. The rockers are assembled on two shafts, each carrying six of them with a support between each two and the rocker. The supports screw into the cylinder head and are easily removable when necessary. For adjusting the valves there is a nut at the top of the push rod at the point of contact with the rocker arm. The valves are  $1\frac{1}{4}$  in. diameter in the clear and the lift is  $\frac{5}{16}$  in. The valve timing at present has the intake open at 17.5 deg. after upper dead center and close 38 deg. after bottom center, and the exhaust opens 42.5 deg. before lower center and closes  $7\frac{1}{2}$  deg. past upper center. This gives a 10 deg. lead of the exhaust over the intake opening for the creation of a vacuum in the combustion chamber. Formerly, there was a 5-deg. lead and this new timing in conjunction with the longer dwell of the valve

opening has been an important factor in securing the 6 additional horsepower from the same engine.

#### Water Pump and Fan Combined

One of the features of the engine which is unique is in the front construction which combines the water pump impeller, fan and fan bearing. This makes a unit of the fan and water pump, with the fan belt driving both. The water connection is direct from this point to the radiator with the pump case a part of the cylinder block and also forming the fan support. Particular care has been taken to give an efficient belt with the simple adjustment, so that the layout can be readily taken care of by the average owner, and in fact requires little or no attention.

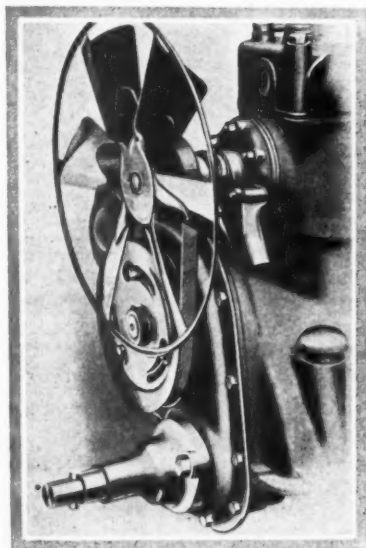
Both manifolds are separate from the cylinders and held to them by dogs and studs. With this arrangement in removing the cylinder head, the entire manifold connection can be taken off with it, and it is not even necessary to remove the carbureter when the cylinder head is taken off. In fact, about the most important connections to be attached are the water and exhaust manifolds from the radiator and muffler pipe, respectively.

Gasoline feed is by the Stewart vacuum system in conjunction with a Marvel carbureter. The vacuum tank is on the front of the dash, that is, engine side, with the main tank having a capacity of  $12\frac{1}{2}$  gal. at the rear. The Marvel carbureter is provided with a heated-air intake and is mounted high on the engine, as shown in the illustrations.

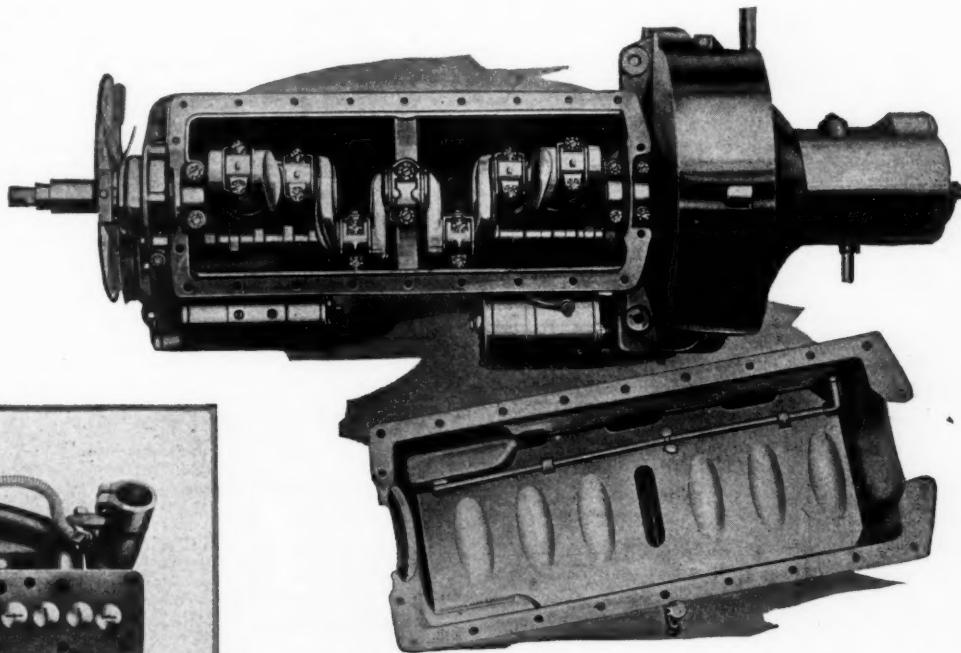
Delco equipment is used for ignition, lighting and starting. This was also true of the model 32 Oakland as far as the last 3 months of production are concerned. Before that time a different make was used.

#### Circulating Splash Oiling Continued

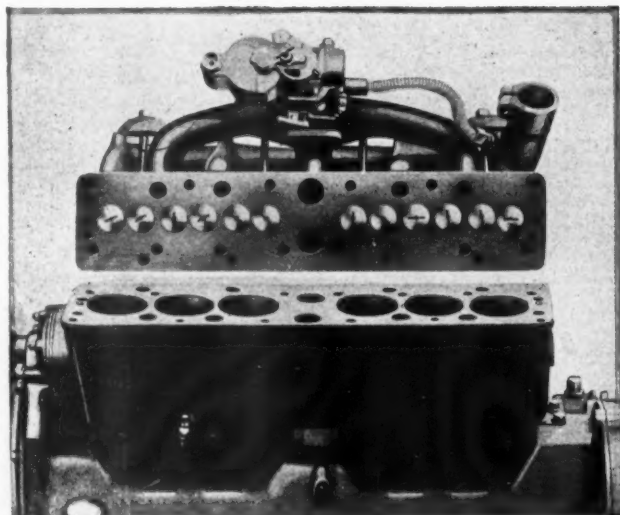
With the exception of the dash pilot lamp, no change has been made in the oiling system, a circulating splash system



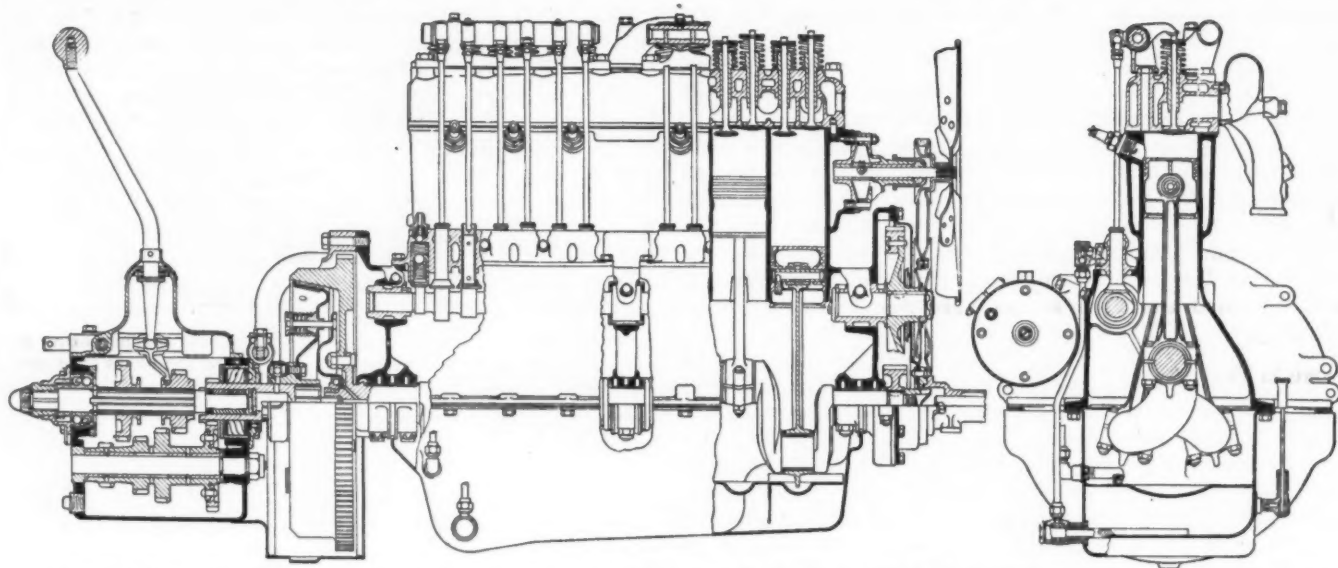
Combined fan and water pump which is a feature of the new Oakland. The fan belt drives both units



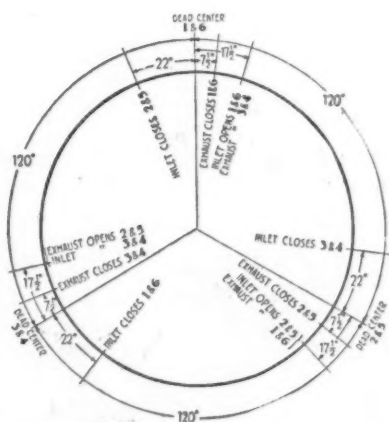
The new Oakland engine, the view above showing the crankcase removed to give an idea of the accessibility of the connecting-rod and crankshaft bearings, and other parts which the car owner or repairman is frequently called upon to inspect. The view at the left shows the cylinder head removed, illustrating the easy access to the piston heads, valves and waterjackets



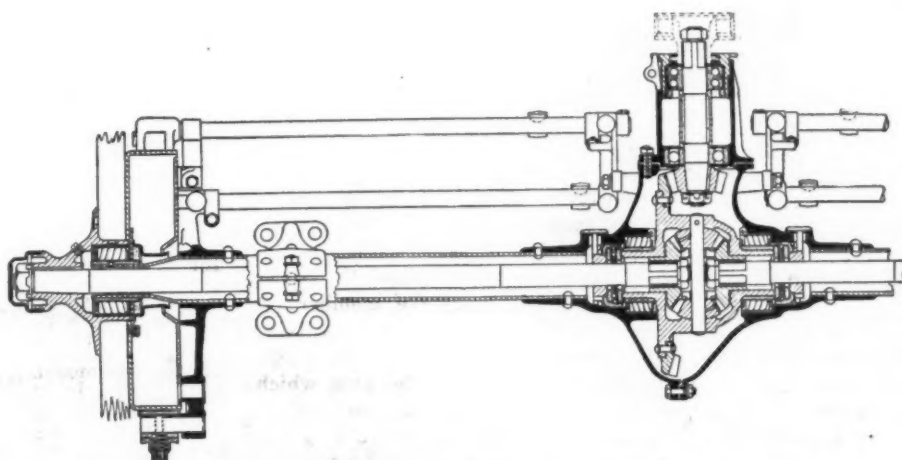
## Engineering Details of Oakland 34



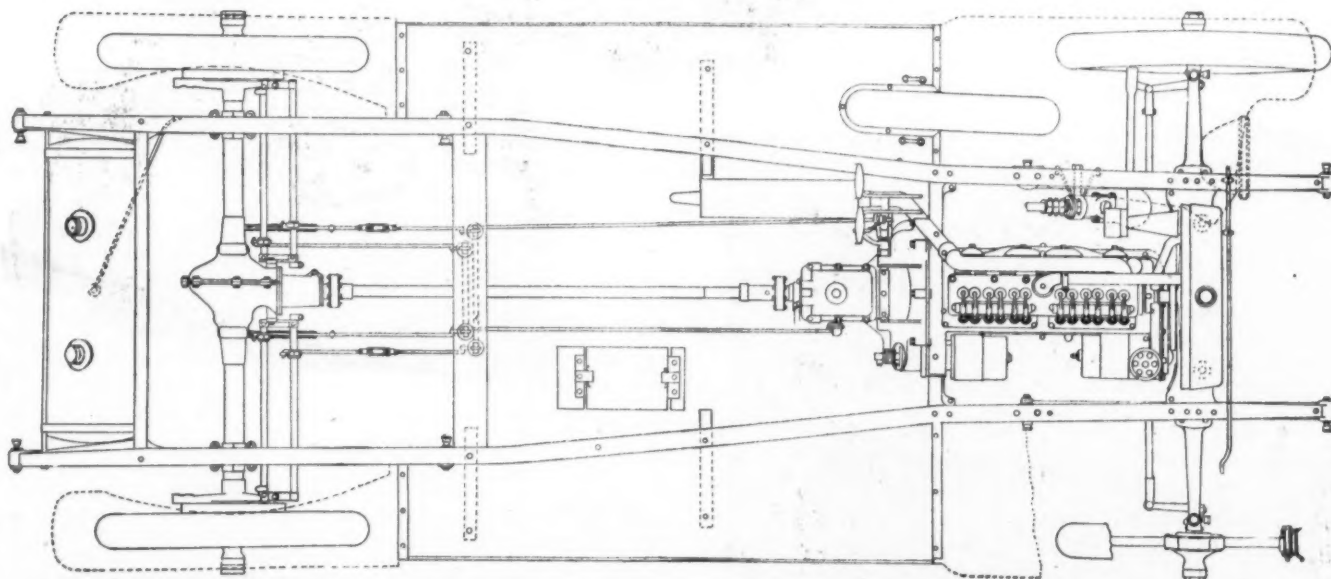
Sectional views through the gearbox and clutch assembly of the unit power plant, the front of the engine and a transverse section. At the front of the engine the combined fan and water pump drive is shown



Valve timing diagram



Section through the one-bearing floating rear axle, showing brake connections



Plan view of Oakland 34 chassis, showing tapered frame, mounting of spare tire on left running board, as well as position of storage battery. Note clean layout due to Hotchkiss drive



being used, operated by a plunger pump driven by an eccentric on the camshaft. This forces oil to a series of splash troughs and the three main bearings. A screen is provided through which all the oil must pass before it again reaches the pump, thus insuring a clean supply for circulation.

#### Unit Power Plant

Both the clutch and gearset are in a unit with the Northway engine. The clutch is a cone type with a ball bearing release and the gearset provides three speeds with reductions in the gearbox of 3.09 to 1 on low, 1.73 to 1 on second, and direct on high. The reverse ratio in the box is 3.98 to 1. These, of course, are multiplied by the 4.5 ratio in the rear axle for final reduction, giving ratios of 13.9, 7.8 and 4.5 on low, second and high speeds, respectively, and 17.9 on reverse gear.

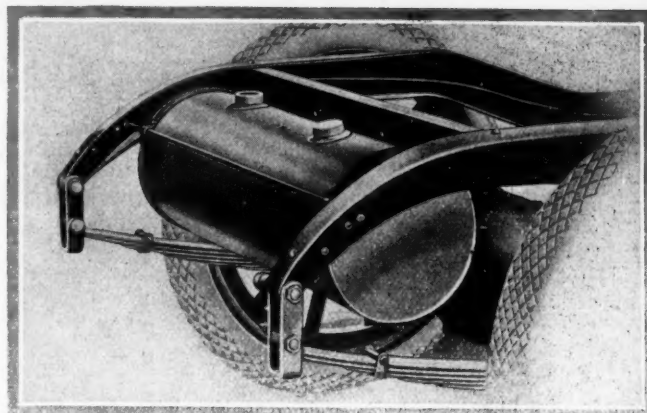
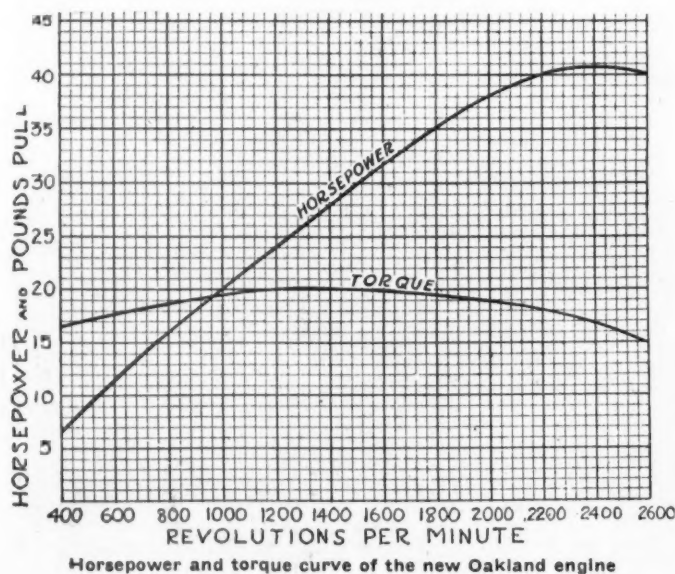
#### Frame Is Tapered

From the gearset the drive is taken through two universals and a hollow propeller shaft to the bevel gear rear axle. The master leaves and the front shackle bolts of the springs are the direct units in the Hotchkiss drive, transmitting drive and torque stresses, and hence have been made extra heavy in this construction. The elimination of torque tubes, arms, and radius rods, together with the simple brake layout, has given a very clean chassis, as is apparent from a study of the plan view. From this view it will also be seen that the rear springs are directed to meet the side members of the frame instead of outside and the entire frame has a pronounced taper to the transverse member at the rear of the engine. This gives a wide support which takes the body directly without the necessity for a sub-structure.

#### Floating Rear Axle

The rear axle is a Weston-Mott. It is a one-bearing floating type with longitudinally split housing. The brakes are external contracting for service and internal expanding on the hand lever. As will be seen in the plan view, the brake links are carried back to the rear transverse member, at which point they are broken with a short link to the rear. Adjustments are made by means of turnbuckles which are also illustrated in the sectional drawing of the axle which appears on the opposite page. The layout of the brake connections is also clearly illustrated.

The steering gear is a Jacox irreversible type with a 17-in. wheel. The control members are notably accessible with a ball type shifting gear within easy reach of the driver. The



Rear construction of the new Oakland, showing the mounting of the gasoline tank at the end of the frame members and the shackle for the semi-elliptic springs which replace the three-quarter elliptic type

floor is tilted beneath the cowl and the pedals project in such a way as to provide plenty of foot room for the driver, as well as the passenger in the front compartment.

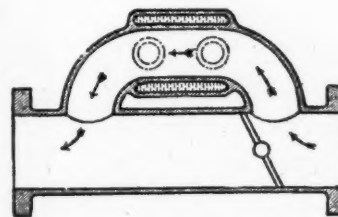
#### Equipment Is Very Complete

In the way of fittings, the car is complete. The tires are non-skid in the rear, and all the necessary instruments including speedometer, ammeter, gasoline gage, switches, etc., are included at the list price. The top is a one-person design or it may be a close convertible at an extra price. The storage battery is an Exide having a capacity of 80 amp.-hr. at 10 amp. discharge rate. The speedometer is a Stewart and the car is provided with a full set of lamps, license plate bracket, electric horn and tools. Trimming is in genuine leather, with coach green for the body and wheels, with black for the fenders as standard. The prices are \$845 for the five-passenger touring and two-passenger roadster, \$980 for the closed convertible sedan model, and \$970 for the closed convertible coupé. A year ago the car sold for \$795 and the \$50 difference in price is made up in the more expensive tires, bigger bodies, and generally better equipment of the new model.

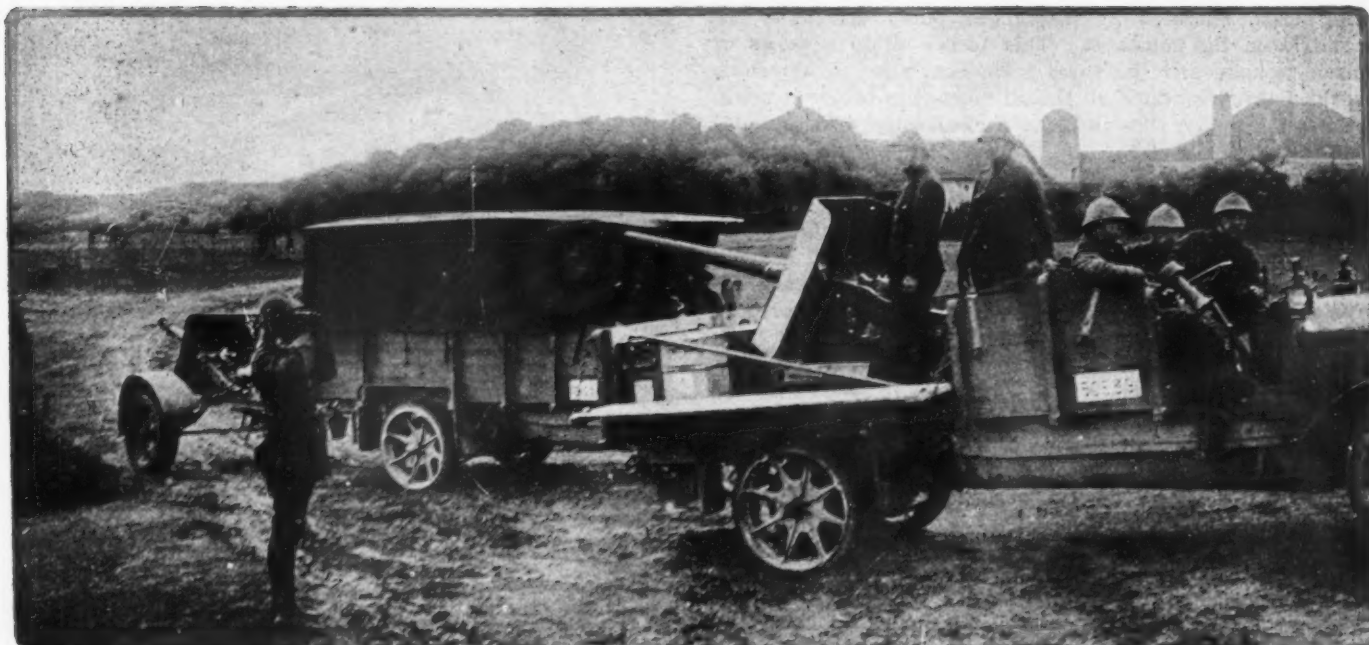
#### Pre-Heating Fuel

IN the paper with which he opened the Detroit section season last month, C. F. Kettering mentioned the advantages of insuring that gasoline should not be too cold when it reaches the nozzle of the carburetor. It is also important that it should not be too hot. C. F. L. King has lately obtained a British patent for an exhaust by-pass intended to provide controllable pre-heating for gasoline or kerosene. In the cut the large pipe shown is the main exhaust line, and the annular chamber surrounding the branch, or alternative passage, is interposed in the fuel line between the tank and the carburetor. When the throttle shown is closed, as in the cut, all the exhaust gas passes through the branch and so heats the fuel in the annular jacket. When the throttle is opened the bulk of the exhaust will pass straight out, thus reducing the temperature in the branch.

In the abstract of the patent published in the official journal, no mention is made as to how the inventor proposes to link up the throttle. Presumably it could be interconnected with the main carburetor throttle with fairly good results.



Device for pre-heating gasoline



Belgian light field pieces used in connection with motor trucks. Note the steel wheels required by their weight



Above—One of the new Belgian armored cars just before going into an engagement. Note how it is painted so as to blend with the landscape, a precaution against artillery fire under all conditions

Right—A train of the new Belgian armored cars with their crews and a squad of the motorcycle sharpshooters who act as skirmishers in connection with the armored vehicles, giving warning of the enemy's approach, etc.



## Belgians Develop

SINCE the beginning of the European war some of the most interesting developments in armored automobile construction have been made by the Belgian army and the most recent constructions which they have produced are illustrated herewith. While no information as to the specifications and general details of these cars is yet available, it may be noted from the illustrations that the experiences of the war have borne fruit in their design.

For example, protection to the car, occupants and equipment has been made as complete as the ingenuity of the engineers who constructed it could make it. Even the rear wheels and rear axle are protected by armor plate as are the radiator and engine hood, in addition to the driver's compartment. Even the spare tires are carried so that they are protected from front and rear fire. Revolving gun turrets are fitted, equipped with either machine guns or rapid-fire light pieces, on the more heavily built types, while gun





*Motor truck drawing a piece of heavy artillery into position at the double quick on the Somme front. Note special trailer*

## New Armored Cars

shields which protect both the rifle and its operators, and which usually are made to revolve, are fitted to the cars designed for less formidable but speedier work, such as skirmishing, scout work, etc.

While the mechanical side of the new armored cars shows direct results of the sometimes costly experiences gained during the early days of the war, the exteriors reflect in another way the development in strategy which has characterized the entire struggle. They are painted in varying shades of gray, green, brown, etc., so that they will merge imperceptibly into the landscapes, whether they may be in wooded or open country, upon the meadows lands or the sand dunes by the sea. This color scheme is not only valuable as a protection against the artillery fire of the enemy, but also helps to prevent the whereabouts or movements of



*Above—One of the Belgian armored cars engaged in outpost work. Note how the crew keep sheltered as they make their observations. The gun turret is pointed toward the enemy*



*Left—A good rear view of the Belgian armored cars, showing how the rear tires are protected from puncture by bullets. The cars are shown here advancing toward the firing line at a rapid pace*



Two of the Belgian armored cars on skirmish work. Note the single large headlight and how the armor plate protects the engine hood and radiator. The motorcycle men are between the cars and the enemy so the crews are simply awaiting the word to advance

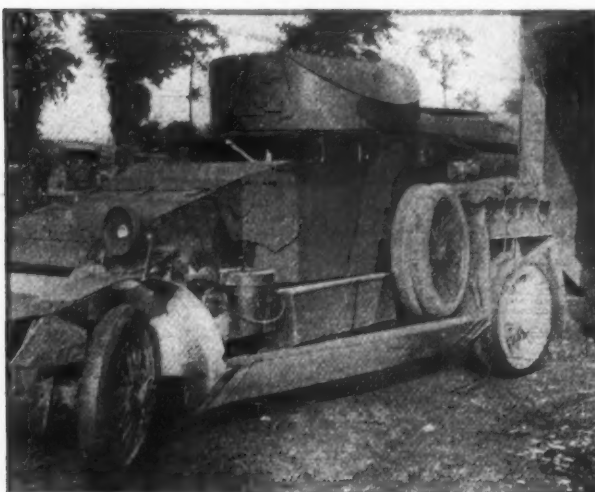


The Belgian armored cars in battle formation behind the lines. The cars differ in minor details such as the size and position of tool and ammunition box, etc. Note the steel-studded tires

the armored cars being discovered by hostile airmen, who are frequently hovering overhead searching with powerful field glasses for just such prey.

#### Touring Chassis Used First

The earliest Belgian armored cars, which won such renown in the first campaigns in northern France were built up from powerful touring car chassis fitted with machine guns and armor plating consisting of steel not less than 5 mm. thick, the gun being pivoted in the center of the single compartment. In some places a revolving pivot was fitted, while others merely had a shield in the front of the gun and revolving with it. The driver occupied the most central position in the machine and was practically immune from attack. He had a view straight ahead through a hinged shutter and in addition had a small port on the right, level with his head.



Left—A feature of the new Belgian armored cars is that there are practically no excrescences which may be shot away. Even the headlight is mounted close to the armor plated hood. Right—An excellent view of the rear construction used on the latest Belgian armored cars. Note the armor plate protecting the tires and the sheet across the rear



# Extending Aluminum's Field

How to Make Best Use of Aluminum Alloy in Automobile Work While Avoiding Difficulties Outlined in Extracts from J. E. Diamond's S. A. E. Paper

THE fundamental advantage of aluminum is quite naturally that of lightness. The specific gravity of pure aluminum when cast is 2.59; when rolled, 2.68. The specific gravity of iron is about 7.21; that of steel somewhat higher. Thus, it will be seen, the weight of aluminum is for equal volumes but slightly more than one-third that of iron. The coefficient of expansion of aluminum is 0.000022 per degree Centigrade (Richards); that of iron is 0.0000119 per degree Centigrade (Roberts-Austin). The melting temperature of pure aluminum is 659 deg. C., or 1218 deg. F. The specific heat of aluminum is 0.22. Its thermal conductivity based on the conductivity of pure silver as unity is 0.313. Of the baser metals, copper, with 0.5, is the only one that exceeds it in thermal conductivity. The conductivity of iron is 0.11, or only one-third that of aluminum. It has recently been discovered that the thermal conductivity of aluminum increases with its temperature and at a temperature of 700 deg. F. is practically three times the conductivity at ordinary temperature. The electrical conductivity of aluminum is 60.5 per cent that of copper for equal volumes; and since copper is three times as heavy, its conductivity is higher, weight for weight. Aluminum is preceded by gold only in malleability, preceding in this respect silver, copper, tin and platinum. It ranks sixth in ductility. The tensile strength of approximately pure aluminum is about 15,000 lb. per square inch. Therefore, as far as strength is concerned, it is seen that even in the unalloyed state, weight for weight, it will compare favorably with fair grades of cast steel. It was early discovered that aluminum unalloyed was too soft and that structures cast in it lacked rigidity. A number of alloys have been developed and have corrected the inherent limitation of the pure metal, at the same time sacrificing only to a limited degree its fundamental advantage of lightness.

The most widely used alloying metals are copper and zinc. Copper and aluminum alloy particularly well with high or low content of either metal. The aluminum bronzes with high copper content have been found to be equal if not superior to any other bronze so far developed. The copper-aluminum alloy most commonly used has a tensile strength of

about 20,000 lb. per square inch. Zinc alloys have been developed having greater strength, but at the present time probably 95 per cent of all automobile and aviation engine castings are made of copper-aluminum alloy.

## Casting of Aluminum

The production of aluminum castings is a science in itself, and present-day success is built on many early failures.

### Points on Casting Design

Make the keynote the elimination as far as possible of complicated coring. When it is necessary, bend every effort so to design the job that as much of the coring as possible can be green sand work. Design as far as possible all sections with uniform thickness. In crankcase design do not try to decrease the thickness of the walls below 3/16 in. A thickness of 7/32 in. is better. The number of sound castings will increase appreciably if the foundry is granted this additional metal, and paradoxical as it may seem, the heavier casting can cost less because of the reduction in the defective casting loss. Design cases so that the ribs, brackets and bosses have plenty of taper. Further, have such parts join the main casting with liberal fillets. It is imperative that when a fairly light section runs into a heavy one that large fillets be employed. As far as possible, do not use loose pieces on the pattern for bosses. In most cases the green sand is not sufficiently strong and it is necessary to use dry sand cores, thus increasing the expense of the work.

It is a long cry from the first attempts of castings to the complicated work turned out to-day. The mere possession of the formulas of suitable alloys by the foundry is not all that is required. Hazardous methods in the foundry are not conducive to the production of sound castings. In the early days "hit or miss" methods in the metal room in the preparation of the "charge" resulted in a great variation in quality of castings.

It was found necessary in the furnace room to control the temperature, lest the metal be burned. Too high a temperature destroys the natural vitality of the metal, and castings made from this burned metal are brittle. In so far as strength is concerned, probably no one factor is of more vital importance than the pouring temperature. The lower this is the stronger the casting. The casting that has barely escaped being a "mis-run" in the thinnest sections, because of

a low pouring temperature, is the best casting from all standpoints. The reason for this is found in the rapidity of crystallization. Naturally, where the metal is poured cold, so to speak, the crystallization takes place quickly; and the crystals do not have time to arrange themselves in orderly manner, as they do if a longer time is granted. The production of successful castings requires careful attention to all the little details.

In the foundries of the Aluminum Castings Company technically trained men supervise every stage in the evolution of a casting, from the analysis of the virgin ingot to the delivery of the casting to the sand blast. Every foundry bay has a pyrometer, each casting being poured at the temperature an expert has determined to be the proper one; that is, just short of a mis-run. It is not too much to say that it is this technical oversight all along the line that makes it possible to produce so many crankcases in a day.

By far the larger number of aluminum engines are those in which the cylinders and crankcases are integral. This is an extremely rigid construction, and the aluminum makes a much lighter construction than the iron engines constructed after this design. Here again the overhead-valve engine is the favored type, although occasionally an L-head is found. Both the Marmon and the new Premier engines have overhead valves. Except in rare cases the heads of all these integrally-cast cylinder and crankcase engines are removable. From a structural and mechanical standpoint the ideal way to make this engine may be with the head integral, but it multiplies many times the difficulties in the foundry. In the present stage of the art it is doubtful if this type of construction can ever be placed on a production basis. The foundry occasionally finds itself taxed to turn out individual castings with integral heads. The cores in the heads are extremely intricate, and require the ingenuity of the best pattern makers and foundrymen to determine how to make and how to hold them properly.

### Details of Sleeve Construction

The general practice has been to lay down a design similar to that dictated by past and current iron-cylinder practice, taking into account the modifications ne-

cessitated both by foundry and by mechanical requirements. The outside diameter of the cylinder barrels is made larger than would be the case with an iron engine, thus accommodating a cast-iron or steel sleeve. These sleeves are either a drive fit and forced into place with a light press, or steam or hot water is run through the jacket space and the sleeve dropped into place. It is essential to get the sleeve into place at once without loss of time, as otherwise it will heat and expand, sticking before it has been dropped home. This construction, in the main, differs from iron-cylinder construction only in that the piston and piston rings operate against an iron sleeve. In the overhead-valve construction this sleeve is flanged at the upper end, fitting in a corresponding recess. In the integral-head jobs, of course, it is necessary to put the sleeve in from the bottom.

When the cylinder blocks are not cast integrally with the crankcase, the bottom of the sleeve is machined flush with the bottom of the casting and is supported, although such support is not at all necessary, on the top of the crankcase, the cylinder opening being somewhat smaller than the outside diameter of the sleeve. When the cylinder head and crankcase are integral the sleeve can be flanged at the bottom and held by one or two machine screws. Another method is simply to upset the aluminum about the bottom of the sleeve.

A discussion of the use of aluminum in modern motor-car construction would not be complete unless mention were made of the Lynite piston. The aluminum piston has come and has come to stay. Any trouble existing has been in the nature of "growing pains." We have learned in

the past year that it is not wise to attempt to carry weight-saving to the limit. In other words, we should all be fully satisfied in cutting the weight of an iron piston in half instead of following the exact design of the latter in order to avail ourselves of the two-thirds saving in weight. The metal thus added will have beneficial effects if employed in increasing the length and the wall thickness of the piston. I have always advocated a long piston with a reasonably thick skirt. In a paper given before the Detroit section of the society last winter I advocated a length equal to one and one-third the piston diameter. The long piston with a fairly heavy skirt will take care of piston slap and should help materially in preventing oil pumping. On account of limitations that cannot be removed, occasionally it may not be found advisable to substitute aluminum pistons for iron ones in an engine already built. The piston unquestionably is the heart of the engine, which should largely be built around the piston.

The use of the aluminum brake-shoe is another step in the direction of unsprung weight reduction. Aluminum brake-shoes lined with suitable brake material have rendered eminently satisfactory service when and wherever tried. Aluminum brake-shoes have not had much vogue in America, but in Europe both the Panhard-Levassor and the Peugeot companies use Cothias permanent-mold aluminum brake-shoes on all their models, both touring cars and trucks. Ordinarily brake-shoes of conventional design lend themselves extremely well to production by the Cothias process. We have produced Lynite permanent-mold brake-shoes, in some cases imbedding in the casting a steel slug to take the action of

the expansion cam. Unquestionably future development in car construction will be in the direction of refinement of details, and I am certain that the aluminum brake-shoe will be heard from in the next 3 or 4 years.

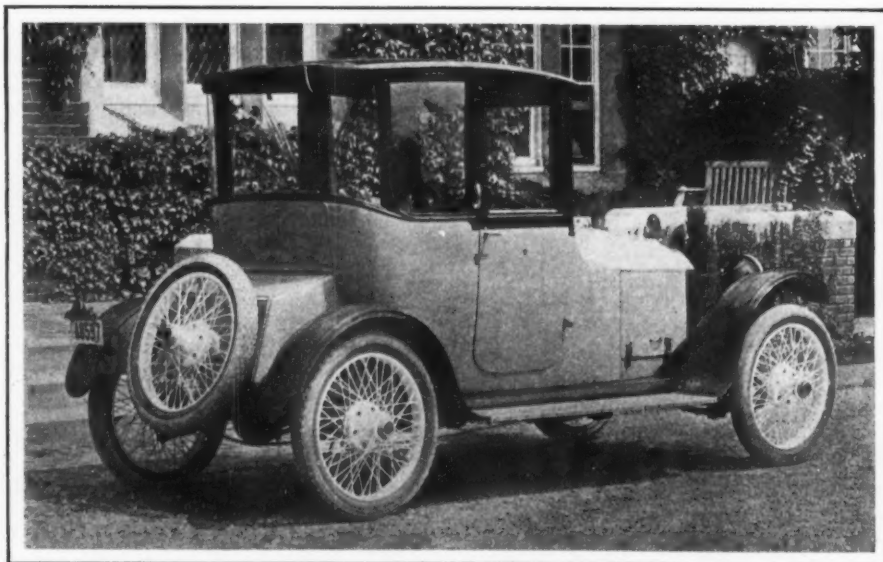
#### Machining Qualities

Casting for casting, aluminum can be machined nearly twice as fast as cast iron, resulting in a corresponding reduction in cost. Fewer men, consequently smaller floor space, are demanded when the shop is laid out to machine aluminum than would be the case with cast iron. Considering the ease with which an aluminum casting can be handled in the machine shop, from the unloading platform to the assembly floor, to say nothing of the rapidity with which the casting can be put through one machine after another, comparative costs will show aluminum, even with the abnormal conditions prevailing, with an increased initial cost for castings as a consequence, to be quite competitive with cast iron. When the market is normal, considering initial costs, casting for casting, it will be found that it is cheaper to use aluminum than iron.

Some time ago a certain manufacturer whose crankcases were machined outside his own plant considered the use of an iron crankcase in the belief that he might reduce his costs. It happened that the manufacturer was, and will be for some time to come, dependent on one shop for the machining of his cylinders and crankcase castings. The manager of this outside shop refused point-blank even to consider machining iron cases, stating that the trouble they were having with the one iron casting was quite sufficient.

## Coupé Body for Scripps-Booth Four Chassis

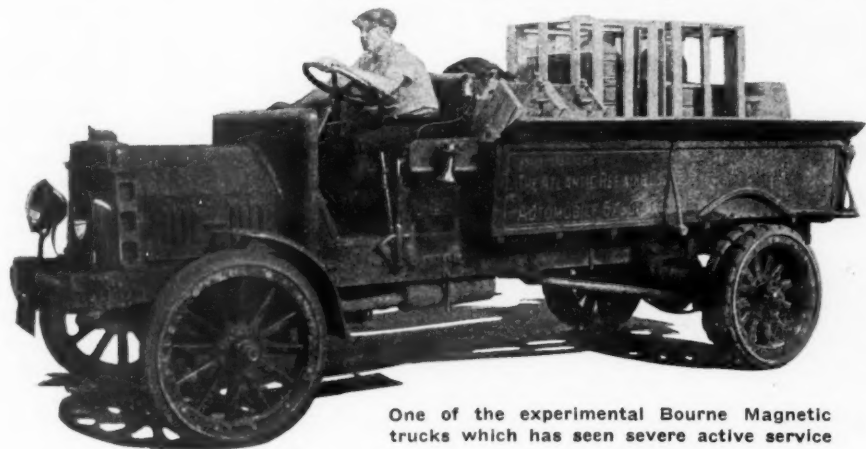
THE coupé body illustrated herewith has been brought out by the Scripps-Booth Corp., Detroit, Mich., for mounting on its standard four-cylinder chassis. The characteristic mounting of the spare wire wheel at the rear of the tool and luggage compartment has been continued, the only part of the body differing from the well-known roadster being the coupé section from the dash to the rear deck. The body is luxuriously finished and maximum light is assured by the almost continuous glass sides, curtains being provided for use if desired. This model is particularly designed for use by doctors and business men who desire an economical closed car for use in cold weather. The price of the coupé model mounted on the standard four-cylinder Scripps-Booth chassis, as illustrated herewith, is \$1,450.





# Bourne Truck Has Magnetic Transmission

New Vehicle Employs Same Unit as Owen-Magnetic Car



One of the experimental Bourne Magnetic trucks which has seen severe active service

THE Bourne Magnetic Truck Co., Philadelphia, Pa., will soon be ready to deliver 2-ton and 3½-ton trucks with a magnetic transmission precisely similar in its method of operation to the Owen transmission used on Owen-Magnetic passenger cars. Experimental vehicles have been driven thousands of miles in actual service, the one illustrated on this page having been used by the Atlantic Refining Co., of Philadelphia, and another has been doing express work in New York City. A great reduction in wear and tear on the chassis and substantial economy in operating costs are claimed to have been proved for the transmission by these tests.

The chassis built is not an entirely new creation erected around the electric transmission unit. S. N. Bourne has built a number of special trucks with gear transmission of which a majority are in the service of the Atlantic Refining Co. They have a number of points of interest quite apart from the transmission, the most noticeable being a special method for mounting the springs. These, as shown in the illustration, have no shackles in the ordinary sense of the word. Instead the end of the spring is flat and makes a square contact with a rocking block, this having a rounded head which rests in a groove provided for it in a bracket attached to the frame.

The best of material is used throughout the truck and it is to be observed that the driver's seat, dashboard, fenders and similar parts have an exceptional rigidity and

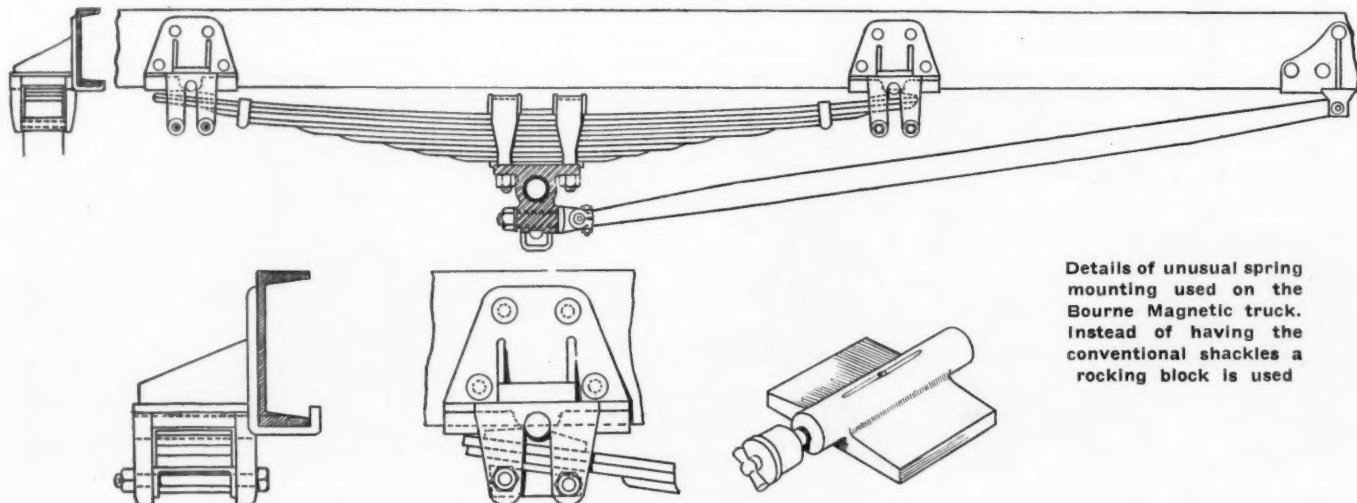
strength. In developing trucks to suit the very strenuous service required by the Atlantic Refining Co. in the distribution of petroleum products the ability of different parts to shake loose was soon demonstrated and that the detail fittings as now supplied are solid enough to withstand any amount of jarring.

Naturally, these trucks are not in the cheap class, the 2-ton chassis costing \$3,150 and the 3½-ton \$3,850. The engines used are similar, both having 5½ in. stroke and a five-bearing crankshaft. The bore of the smaller engine is 4 in. and that of the larger 4¼ in. The cylinders have individual removable heads giving maximum facility for cleaning out the combustion chambers. A non-adjustable type of carbureter is fitted and ignition is provided by high-tension magneto with fixed spark. An electric lighting and unusually powerful starting system is, of course, provided by the transmission.

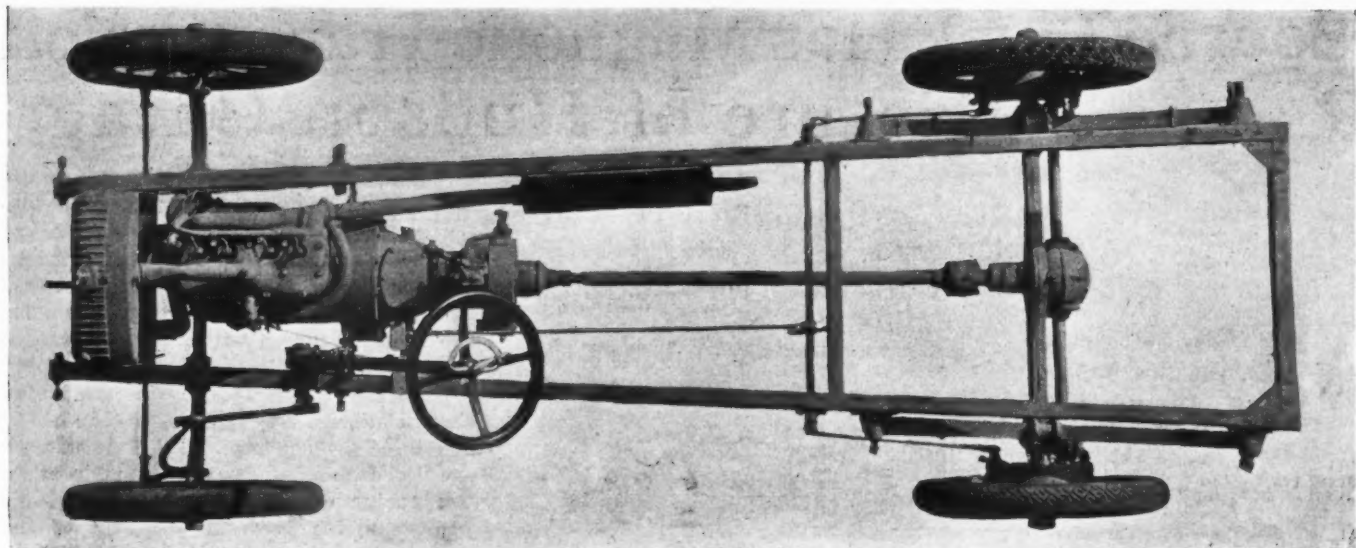
The transmission is mounted integrally with the engine, being bolted up to the crankcase precisely as on the Owen-Magnetic car. The control operates exactly like a throttle lever, the engine control being confined to a foot accelerator. Both trucks are governed, the smaller to 15 and the larger to 12 m.p.h.

The frames are constructed to give a maximum flexibility, the side rails being 6-in. chrome vanadium channels and the cross members little more than distance pieces to keep the side rails apart. This means that a very large amount of weave is permissible and cannot result in loosened rivets. The power plant is mounted on three points so arranged that any distortion of the frame cannot possibly transfer stress to the crankcase.

The rear axles are of the worm type and carry two sets of inclosed brakes. In addition to these, which are operated by the usual pedal and hand lever, there is a powerful electric brake which can be brought into action any time when the truck is moving. This brake consists of an arrangement of switches which causes the part of the transmission driven by the rear axle to operate against a strong electrical resistance and the electric brake is applied by the movement of the same lever which controls the different electrical speeds.



Details of unusual spring mounting used on the Bourne Magnetic truck. Instead of having the conventional shackles a rocking block is used



Chassis of new 1500-lb. Republic truck, showing clean design, power plant mounting and tapered frame

## Originality in 1500-Lb. Republic

**F**EW firms in the motor truck industry have grown as rapidly as the Republic Motor Truck Co. of Alma, Mich. This concern is planning to make 23,000 machines next year and more than half of these will be the new 1500-lb. delivery truck which will be known as the Dispatch model. The first of these is now on its way from the factory to Los Angeles, on a demonstration run.

The chassis is in every respect a truck engineer's job and is therefore capable of being run on solid tires. Pneumatic tires can be used and either of the following tire equipments will be provided, 32 by 4 in. (non-skid rear) pneumatics, or 32 by 3 front and 32 by 3½ rear solids.

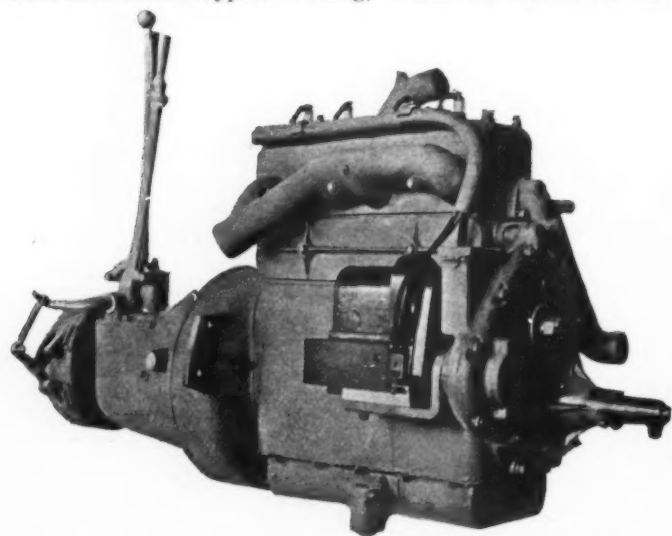
The engine is new, having been designed especially for this particular chassis. It has a bore and stroke of 3½ by 5 in. with cylinder barrels cast integral with the crankcase. The crankshaft is quite unusual, as it has ball bearings; the diameter is 2½ in. and there is no center bearing, the rigidity being obtained by making the cheeks of a massive section. There is a detachable head which greatly facilitates removal of carbon, and the valves are arranged in a normal L-head manner being 1¾ in. diameter. The lubrication is maintained by a submerged oil pump; ignition is by Bosch magneto and thermo-syphon cooling, which has been used suc-

cessfully by the Republic company on other models, is also adopted for this, the smallest of the range.

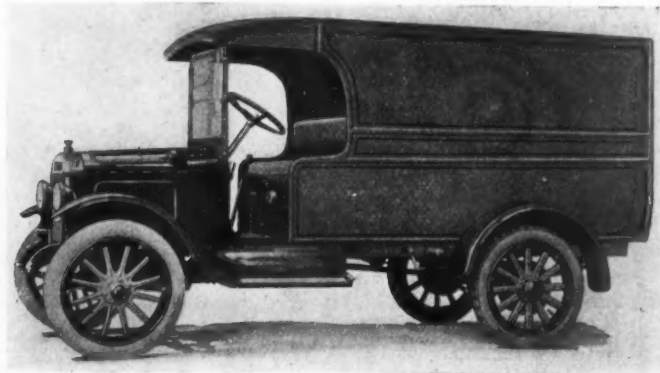
The transmission, which gives three speeds, is bolted up in unit with the engine, the flywheel being inclosed in a bell housing. It contains a multiple dry disk clutch. The internal gear axle is a Torbenson.

As typical of the robust nature of the chassis, the frame layout shown in the illustration should be noticed, and another typical truck feature is the radiator which has cast tanks and a special form of core. There is one standard wheelbase of 110 in., but two bodies are provided. One of these is the regular express type with canopy top and side curtains and it is this model which sells for \$750. A large solid panel type is provided for an extra \$25. The length of either body is 81 in. and the width 42½ in., the height from floor to top being 54½ in. As to the color scheme, the Republic yellow wheels are adhered to, the body being finished in Brewster green. A glass windshield and electric lights are included in the equipment, the necessary current being provided by a Bosch generator. Starter is extra.

Somewhat similar in general design are the Republic models 10 and 11 rated at 1 ton and 1½ ton. These have wheelbases of 124 and 144 in., the model 10 costing \$1,095 with either express or stake body and the model 11, \$1,275 for the chassis only. The engines of models 10 and 11, like model 9, have a 5 in. stroke, but the bore differs being 3½ in. for the model 10 and 3¾ for the model 11. The 2- and 3-ton chassis will not be materially changed.



New 3½ by 5-in. power plant used in Republic Dispatch truck



Republic Dispatch truck of 1500 lb. capacity, with panel body



# Ramps a Feature of Hudson Garage

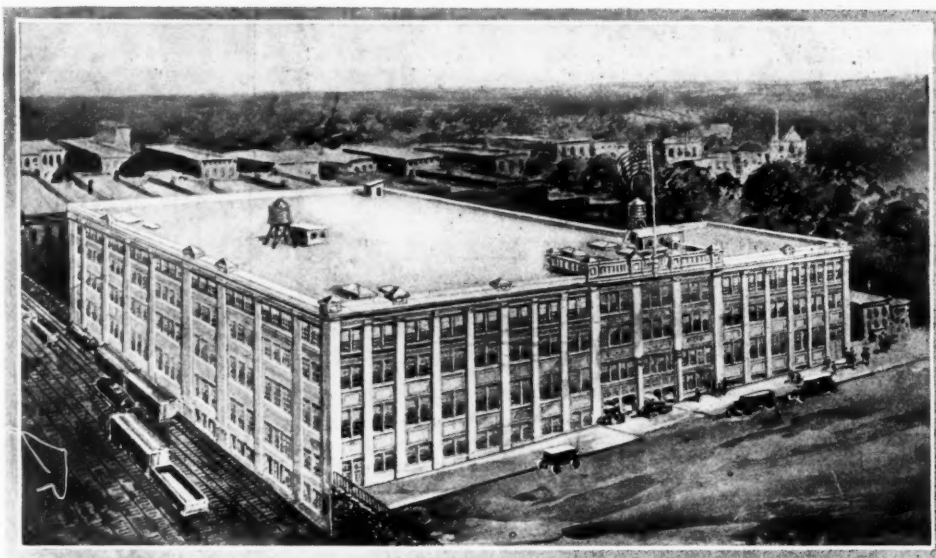
Will Cut Overhead \$18,250 Per Year Besides Saving Each Customer 20 Min. Per Day—Four-Story Structure Will House 600 Cars in Individual Spaces

A FOUR-STORY garage to store 600 cars without the use of an elevator is in course of construction by the Hudson Motor Car Co. of New York. It is estimated that it will cost \$600,000. By the use of two 20-ft. ramps in place of elevators the company has not only saved each customer nearly 20 min. time each day, but it has saved itself a heavy overhead expense of about \$18,250 per year. This is based on engineering facts giving the cost of each trip of an elevator as 10 cents. Approximately 250 cars would be going up and down these elevators each day, thus giving the above figure. In regard to the time saved by the use of ramps, it is stated that there is no possible chance of congestion and it is possible for a car to come down the ramp from the fourth floor to the street in between 10 and 15 sec. The space taken by the ramps is equal to that taken by the elevators.

The garage will be public and is being built on a plot of 41,000 sq. ft., giving at least 4 acres of storage space. It will run 100 ft. west of West End Avenue to the New York Central tracks and clear through from Sixty-eighth to Sixty-ninth Streets.

Every point in construction and equipment has been well looked after. The ramps, instead of running in spiral form as in the garage of the Automobile Club of America, reach their respective floors in practically a straight line, there being only one turn from the third to fourth floors. The ramps will run at an angle of from 10 to 15 deg. One will go to the first floor and the other will go to the other floors. The use of these ramps eliminates the inevitable delays of elevator service. Each set of ramps is divided by a concrete curbing, thus eliminating all danger of sideswiping when cars are going in opposite directions. Two cars can pass comfortably on the ramps, thus avoiding any possible congestion on the up or down trip. Extra precaution has been taken against skidding on the ramps by the use of an abrasive metal. During the busy parts of the day, there will be an attendant on each floor entrance to guide the cars from their floors, thus eliminating all danger of possible collision.

A scientific layout has been adopted in the car spacing.



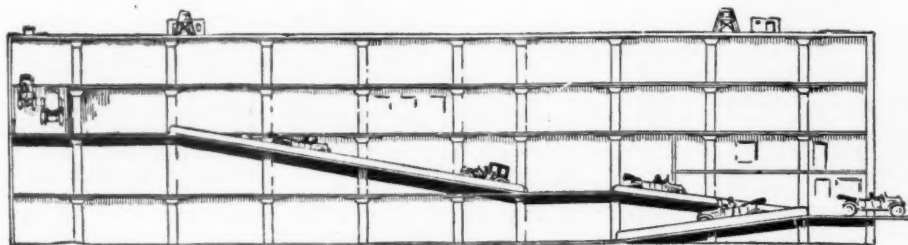
The new garage being built by the Hudson Motor Car Co. of New York

Each customer is assigned a specific space and number. Each space is provided with a concrete guide 10 ft. long, 49 in. wide and 4½ in. high, located under the car between the wheels. The car can thus only enter the space when it is lined up correctly. A small bumper, 6 in. high, is provided for blocking the rear wheels. There is a 14-in. space between the running boards of the cars. Each car is pushed out into the 18-ft. aisle to be washed right in front of its space. The company has introduced, due to its architect, H. B. Mulliken, portable washing racks for each of the twenty aisles. These racks or cranes are run on an overhead track and are equipped with a cape large enough to cover a car so as to protect the other cars from splashing. A row of electric lights inside the cape is also equipped. Hot and cold water and compressed air are conveniently placed in each aisle. As the rack is moved to one end of the aisle, it is quickly and conveniently connected with either the hot or cold water by means of an air-brake coupling, another feature introduced to save time.

Each car space is provided with a spacious locker, large enough for two tires and other equipment.

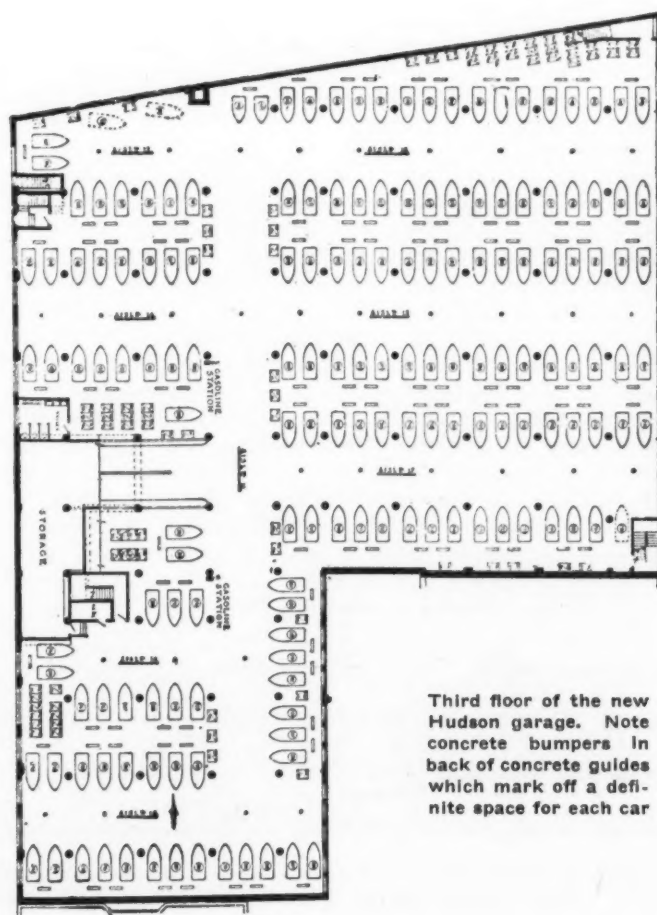
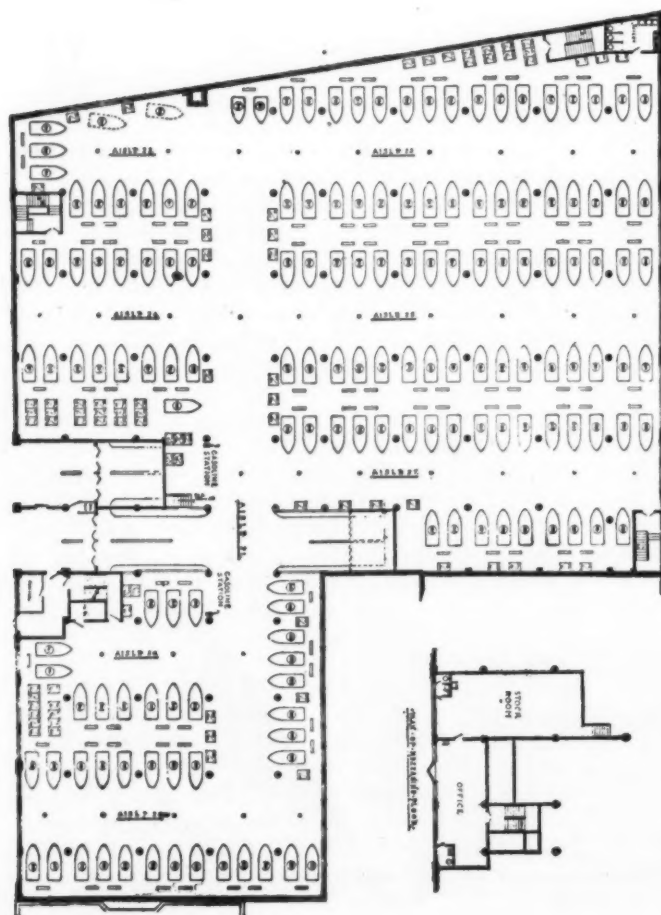
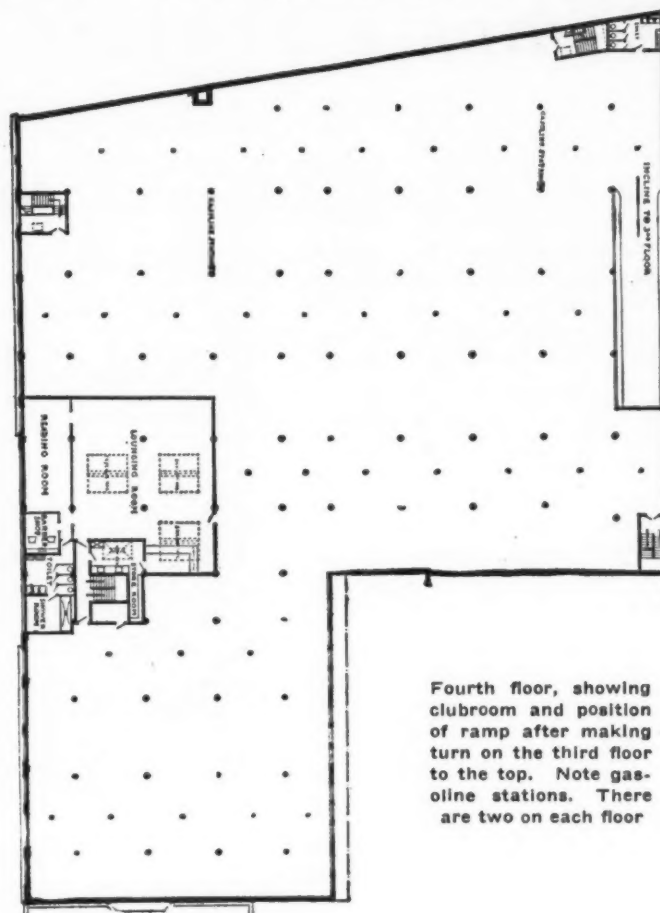
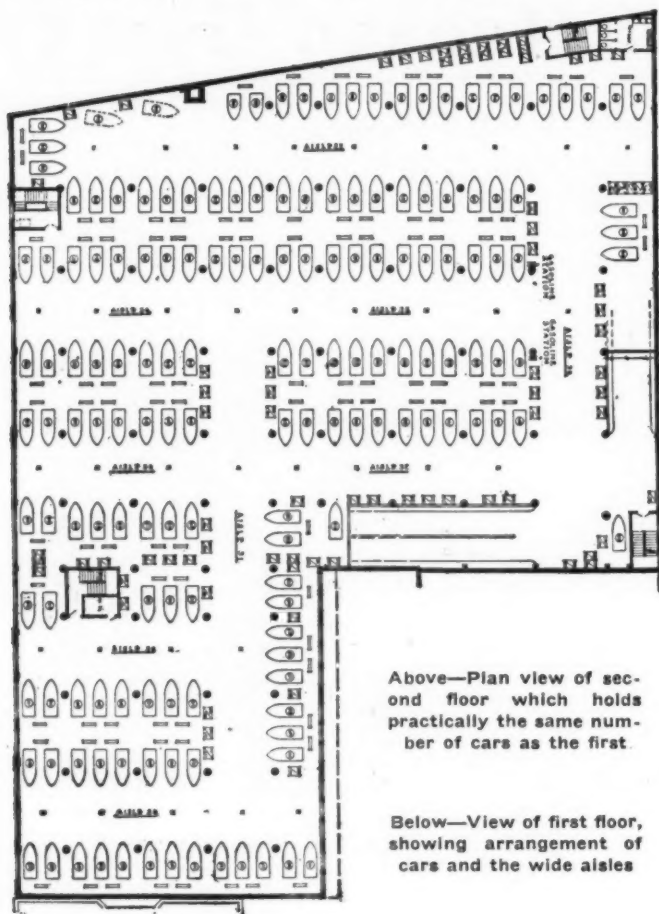
Part of the fourth floor will be used as a club room for the drivers. There will be a barber shop, library, restaurant, billiard and pool room and a smoking room. Each will be completely furnished by the company which will control each department. Meals will be furnished at cost.

Much has been planned for the convenience of customers. For instance, each floor will be equipped with a signal, which will flash the number of a car wanted. This device will be controlled at the office on the ground floor. Time is also saved by the installation of telephones on each floor. There will be a large supply



Cross-sectional diagram of the Hudson garage, showing the use of ramps

# Layout of the Four Floors in New Hudson Garage





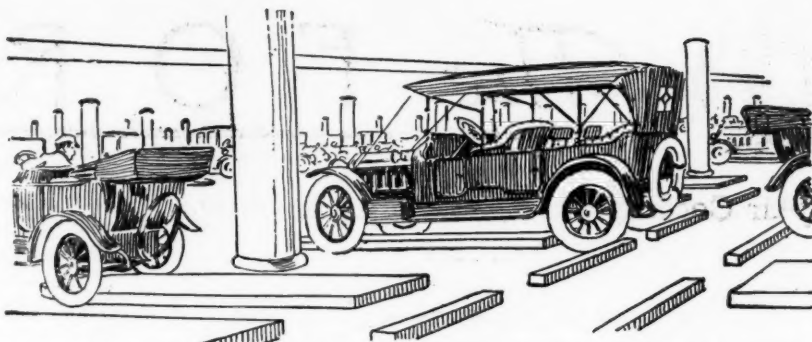
department on the ground floor. The Allen pressure system will be used for pumping gasoline and oil to each floor. A gasoline storage capacity of 23,000 gal. will be available. There will be a machine shop on the fourth floor, 40 by 100 ft., where chauffeurs will be allowed to work on their cars free of charge.

#### Only Two Entrances

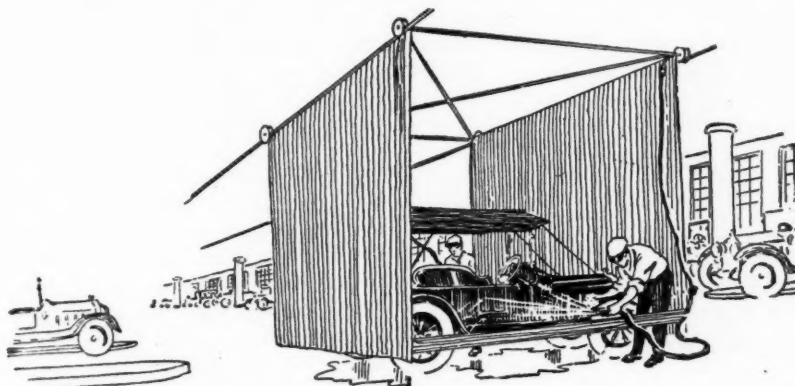
There will be two entrances only, these being on Sixty-eighth Street. Exits in case of fire will be established, two on Sixty-ninth Street and two on the West End Avenue side of the building. For fire protection an automatic sprinkler system will be installed. There will also be sand pails and Pyrene fire extinguishers placed at short distances apart on the floor. In addition to these precautions, automatic steel shutters will be installed to cut off each floor in case of fire. These shutters are held open by fusible connections which will melt when a fire occurs allowing them to close. A large siren horn will be installed on the floors and will be used in case of fire.

#### Details Well Planned

Such details as checking all outgoing and incoming cars, keeping track of each person that enters the building, provision for adequate lighting, etc., have been given careful attention, always with the practical side of the application of each in view.

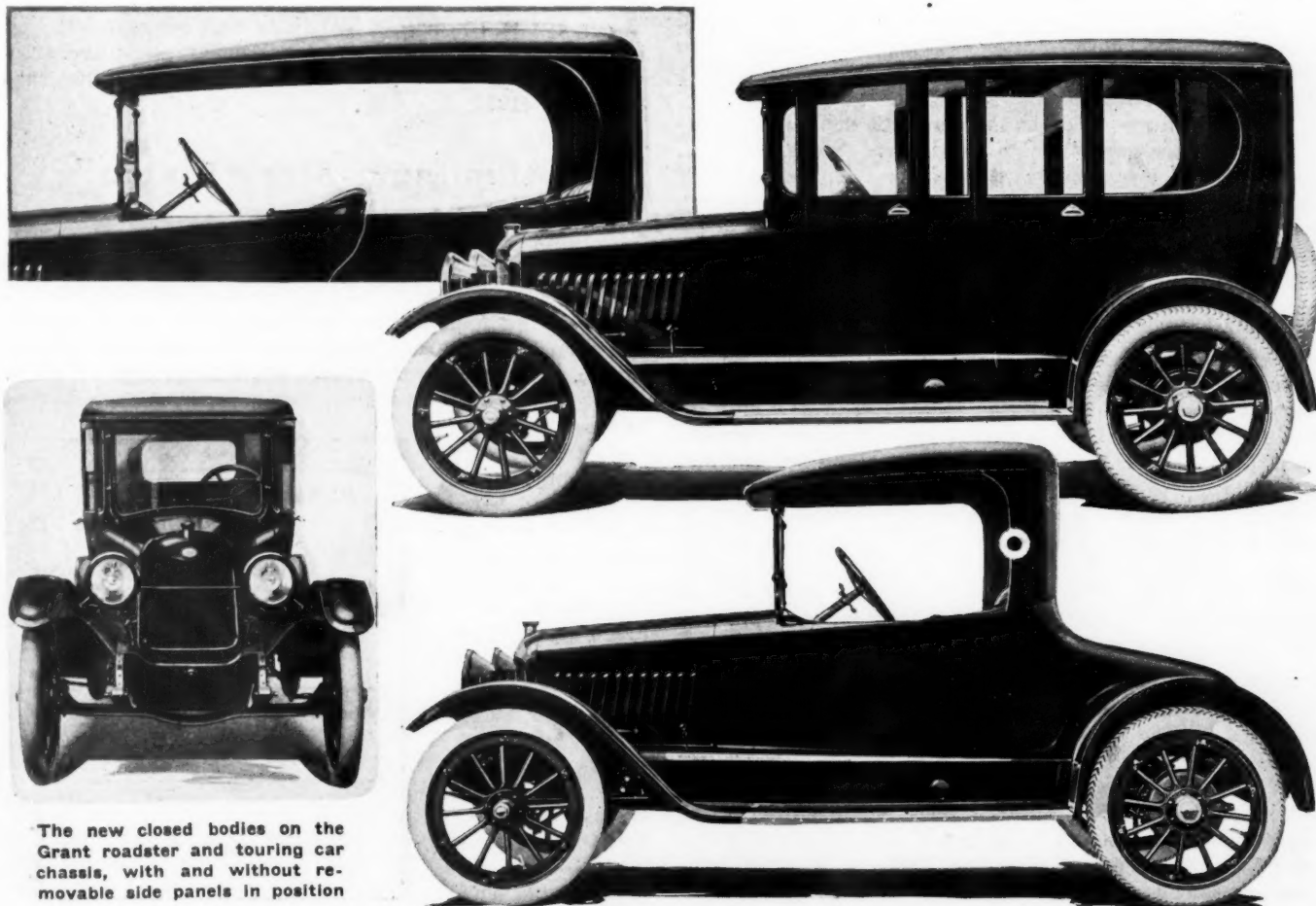


Each car has its own space in the Hudson garage and is blocked by concrete bumpers so that an aisle is kept open between the cars



A feature of the garage is the use of portable washing racks, there being one rack to each aisle

## New Winter Bodies for Grant Chassis



The new closed bodies on the Grant roadster and touring car chassis, with and without removable side panels in position



# The F O R V M



## Air Cooling and Two Cycles to Solve Troubles

By Charles E. Duryea  
Consulting Engineer

THE AUTOMOBILE for Oct. 12 contains two articles that should be read together understandingly, and that this may be done I venture to call attention to them. Mr. Manning shows us that present day gasolines contain liquids having boiling temperatures of 175 to 210 deg., and Mr. Kline tells very properly of lubrication troubles traced to kerosene from the fuel diluting the oil in the crankcase and thinning it so it failed to lubricate.

Having recently been the victim of ruined bearings undoubtedly due to some such cause I feel strongly on this subject. One engine was run for many months with a rather small radiator, and aside from getting rather hot, gave no lubrication troubles. Duplicates of this engine were fitted with larger radiators and kept cool. "Impossible to make them boil" and similar remarks were heard concerning them. But bearing troubles followed. Not once, but more than once on the same job, and after great care had been taken to know that the oiling pump was working properly and that the oil line to the bearings was clean and open.

### Cooling Too Efficient

It may seem like a far cry to blame the large and efficient radiator for the burned out bearings, but experience forced me to believe that there was a connection and that our fuel was being cooled too much after entering the cylinders. The temperatures mentioned by Mr. Manning show conclusively that my belief was correct.

Very few water-cooled engines run with their walls above 175 deg. unless controlled by thermostat. While on short, hard pulls they commonly exceed this temperature, they may run for miles at a time with much of their wall surface considerably below this temperature. Every particle of liquid that has a higher boiling point and strikes such a cool wall will remain liquid and work down to the lubricating oil unless the heat of the combustion for an instant may raise the temperature beyond the boiling point and partly vaporize it. Anyone who has noticed that a paper tag pasted on the bottom of a kettle or frying pan will remain there during many a dinner cooking can readily understand how unlikely it is that any instantaneous application of heat will vaporize such fuel so long as the wall is below the boiling temperature.

Many suppose that compression heats the new charge and vaporizes it. This is true if the liquid continues to float in the mixture, but any drops—that are on the walls, or any vapor in contact with the cool walls, remains cool in spite of the compression and, since the temperature does not raise the compression, opposes vaporization, and tends to increase the liquid deposit on the walls.

### Suggested Remedies

These are the conditions. What is the remedy? The first easy, proper one is to use hotter engines. Keep the walls so hot that no liquid fuel can remain on them. A thermostat that holds the water temperature well to the boiling point will catch the lower boiling point fuels, but it will not serve for the ones that have boiling points as high as 210. Who knows but that there may be even higher boiling points in use? A second remedy is to pass all the fuel through the

crankcase as in two-cycle practice. This may sound foolish, but let the man who thinks so tell us the objections.

The maker who knows that kerosene will enter his crankcase in definite quantities can provide for lubrication accordingly. It is the engine which is not designed for such a mixture that suffers. It is the uncertain and indefinite mixture of kerosene with the oil that upsets the oiling system.

By mixing a high fire test oil with the fuel and feeding the mixture through the carbureter into the crankcase, we do away with mechanical means for lubricating the engine and its crankcase parts. We substitute fresh oil for the ever more diluted mixture that causes the trouble. We get a known and satisfactory oiling mixture instead of beginning with oil and ending with mostly kerosene and an unknown proportion of the original, but now old and dirty oil. Surely this is an advantage. This remedy assumes that the engine is so constructed as to pass along any oil more than the proper level, as most engines do. Anyone who has over filled his crankcase and seen excess smoke in consequence understands this. Any kerosene splashed on the piston head inside will be vaporized and pass along with the mixture as it is drawn from the case to the cylinders. The oil is less likely to vaporize and so tends to remain.

### Air-Cooled Two-Cycle Engines

To step further in the answer to this problem I suggest air cooling, so that the cylinder walls may without question be hotter than the fuel boiling point, and two-cycles, which, if air cooled, have crankcases quite warm and tend to properly vaporize the mixture while in the crankcase. Both these things are in the line of simplicity and economy and will come as soon as the public learns enough about the automobile to decide for itself instead of buying what Jones buys or Smith sells.

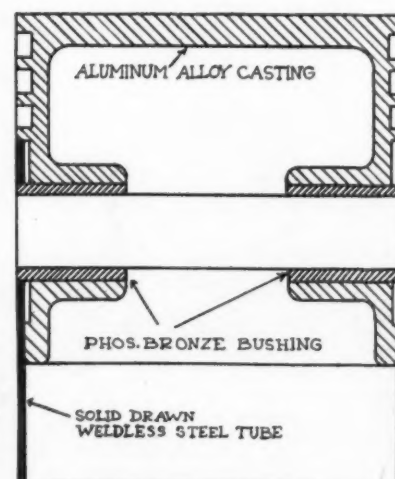
## Aluminum-Steel Piston

By W. H. Bishop

WITH reference to the recent article in THE AUTOMOBILE by A. Ludlow Clayden, on Aluminum Pistons, I beg to inclose print and outline specification of my composite aluminum and steel piston and trust same will be of interest to you, as it appears to entirely provide the type of piston which your article calls for to overcome the drawbacks and disadvantages of the present type aluminum piston.

With my design you will note the following points:

- 1—Simplicity.
- 2—Small cost of manufacture over and above the ordinary type piston.
- 3—Saving in weight of aluminum.
- 4—The amount of aluminum exposed to cylinder wall is only approximately one-





tenth of the total length of the piston; the outer wall of piston consisting practically of the steel liner and piston rings.

The piston consists primarily of two parts—a cast aluminum alloy head with extension which extends to just below the wrist-pin bosses. Fitting around the aluminum casting is a steel tube, the lower extremity of which extends well below the skirt of the casting and the upper portion is carried up to the first piston ring. The steel tube has two holes to take the extreme ends of the wrist pin, and the steel tube is located and held in position by the pin.

It will be noticed that the amount of aluminum alloy exposed to the cylinder wall is only approximately one-tenth of the total length of the piston, the outer wall of the piston consisting practically of the steel liner and piston rings, thus insuring, with the combination of the steel liner and the rings, a perfect gas-tight piston.

With regard to weight of this piston compared with ordinary cast-iron pistons, a good saving in weight is effected. For example, a typical cast-iron piston of 4-in. bore weighs approximately 4 lb. as against an approximate weight of 2 lb. with an aluminum alloy piston with steel liner. As regards cost of production, these pistons can be produced on an economical basis as a minimum amount of aluminum alloy is required owing to the short length of piston skirt, by making the liner from solid drawn weldless steel tube cut to length and machined to required limits.

## Spring Attachment as Shackle-Bolt Rattle Eliminators

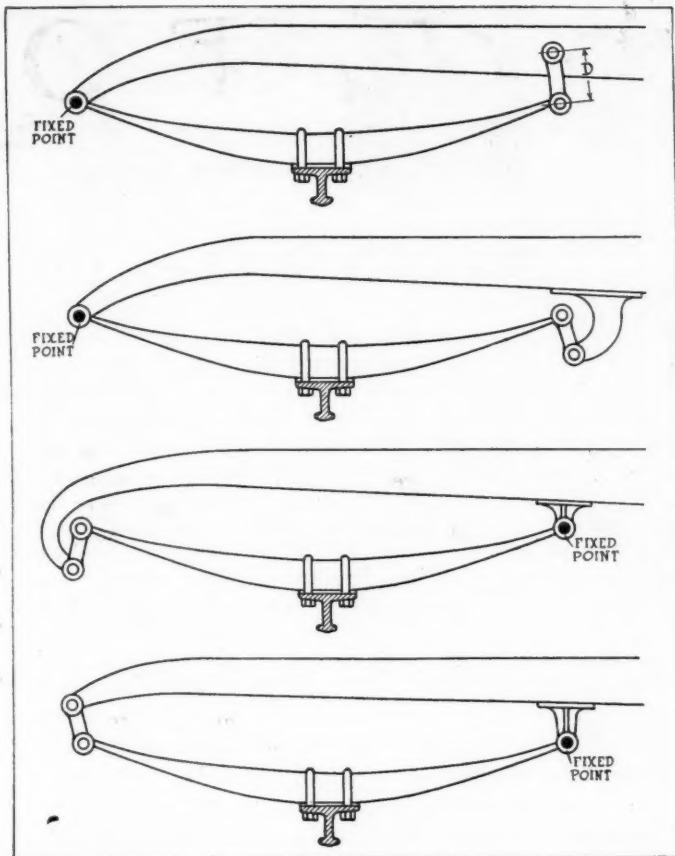
By G. E. Wendle

Williamsport Electric Co.

I HAVE been much interested in your recent articles on spring designs as applied to pleasure cars, and in order to extend the field, I am taking the liberty of requesting you to open wide the columns of your magazine to persons with spring attachment experience.

As an automobile enthusiast, I find one of the greatest annoyances in and about cars to be the rattles and noises, due, in many cases, to shackle bolts. Various manufacturers have made modifications in application of the shackle links, push or pull, various changes in the center-to-center distance of shackle bolts and in using oil lubrication instead of grease. All these changes have been tried over and over again by the makers, and still the rattles and noises continue.

Would this not be a subject of wide interest to automobilists? The trouble is common to all and if your columns were opened to reports of improved methods, etc.,



Forms of spring attachments to frame and front axle, showing usual designs of shackling. The length of shackle links  $D$  varies widely in different designs, once the angularity of shackle links varies similarly

would it not likely result in placing the matter of spring attachment on a better engineering basis.

### Wants Other Views

The sketches on this page show the front axle layout. Of course, the rear axle comes with the question.

The method of lubrication and shackle bolt design both vary widely. What are the advantages and disadvantages of the various methods of attachment, lengths of shackle links, grease or oil lubrication, etc.—as shown by operating experience with pleasure cars? What kind of bushing—bronze, graphite-filled bronze, impregnated wood, or other material has proved most satisfactory?

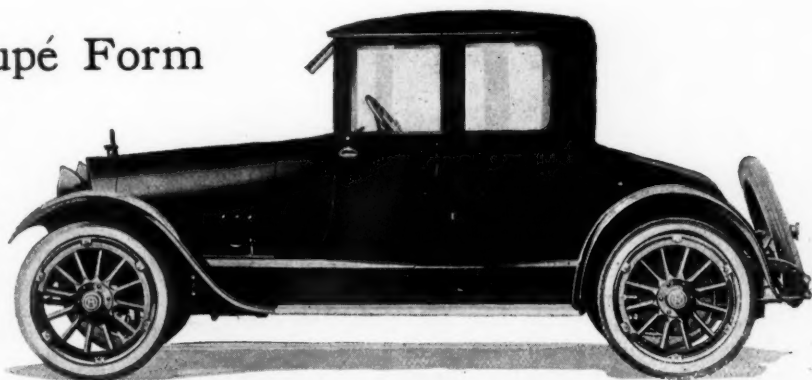
If this article attracts the attention of some of our engineers I shall greatly appreciate reading their views.

## Owen-Magnetic in Coupé Form

THE Owen-Magnetic coupé, claimed to be especially suited to women drivers, is now on exhibition in the company's salesroom at Broadway and Fifty-seventh Street, New York City.

The new car was especially designed for women drivers, and more particularly for those who are afraid to drive in the congested thoroughfares. The new coupé is designed for three passengers but an extra seat for a fourth person is provided which folds out of sight when not in use.

The car has a wheelbase of 125 in. and there is ample room under the rear deck.



New Owen-Magnetic coupé especially suitable for the use of women drivers



# The Rostrum

## Reader's Idea for Sporting Phaeton

**I**NDIVIDUAL and exclusive design has at last come into its own. The automobile enthusiast of to-day is not compelled to pay a very high price for a car modeled after his own design. The chassis can be purchased from any manufacturer and in the case of the lower-priced cars selling around \$1,000 or more, an additional expenditure of \$1,000 for a body and its accessories will give the owner a car suited to his own ideas and uses, and above all a car which he knows is his own individual creation. In large cities hundreds of these special jobs may be seen, every one having an air of luxury and style about them that compels immediate attention. The higher priced the chassis, the more luxurious the body and since a few thousand dollars is a good price to pay for a car nowadays the purchaser of a car of this price is entitled to an expression of his own ideas, if he has any.

### Predicts Long Wheelbases

The writer has endeavored to show by the accompanying illustration the possibilities of uncommon design in the open types. The reader will at first glance call it a freak. With a little more study he will find that it is original, luxurious and a sport car, without any sport disadvantages. The design here shown embodies one idea that has never been expressed on a stock model nor on very few special jobs. There are other points of design that are uncommon, and will be explained in order. The writer predicts cars of very long wheelbases as the road conditions of the country improve. The wheelbase of the car shown in the illustration is approximately 155 in. The reason for this being the position of the radiator, the roomy body both in the driver's compartment and the tonneau, and the position of the rear seat which is slightly forward of the rear axle. However, it will be noticed that by placing the radiator over the front axle and shortening the space in the cowl and reducing the space between the rear wheels and the doors that the wheelbase will be considerably reduced. The chassis is hung very low yet with the usual road clearance. Long flat springs are used, the rear ones being almost horizontal with the frame and are of the heavy underslung cantilever type. The writer is convinced that springs of this type will offset any disadvantages as to the riding qualities of the car by placing the rear seat in front of the axle. The frame and rear springs are so built as to keep the chassis at all times horizontal with the road. There is nothing more unsightly than the back part of a motor car several inches higher than the front part, a feature which gives the car the appearance of running down hill all the time.

### Radiator the Starting Point

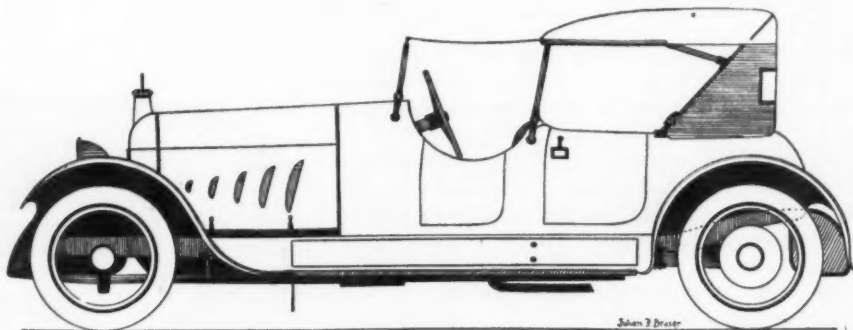
The radiator is of the large, rounded type with a large water cap, and mounted several inches back of the front axle. This is the starting point, in designing the rest of the car. In order to get fast, racy lines, the body must have the appearance of flowing away from the radiator, bonnet and cowl. The bonnet and cowl rise gradually

in a straight line to the slanted windshield. Note that the steering column, which is pitched quite low, is mounted close to the cowl within easy reach of its instruments. Note the curve of the cowl. This gives a sporty appearance to the body as well as facilitating the driver in the handling of the car. Note the double cowl and its windshield, a feature found on very few cars. It is collapsible, folding backward out of sight into the back of the front seat, a light wooden roll curtain raised from the floor and locked on to the top of the cowl hides it completely from sight as well as offering protection from breakage. Note the large door in the tonneau, its size in proportion to the fore door, and that the sides of the tonneau are quite high yet not topheavy. The upholstering is of the heavy armchair kind, barely showing above the top of the body, the thick cushions resting flat on the floor of the body. Note the bulbous back and the manner in which it is pitched forward, giving the body the fast, sporty lines of a phaeton. Note the shape of the top, which covers only the after part of the car. Its design is superior to the Victoria type since it permits a better view when raised. In order to protect the occupants of the front seat in rainy weather a curtain pulls out from the top and is fastened to the front windshield. It is also rigid enough to support side curtains if they are desired. Note that the fore doors are much smaller than the rear ones and that the handles are left exposed to break the smooth sides. There are no moldings around the doors, they fit flush with the sides of the body. Note the shape of the louvres in the hood.

### Six-Cylinder Engine

The engine is of the six-cylinder type with worm drive having its own starting and lighting system as well as tire pump. Wire wheels with 35 by 4-in. tires are used. The gas and oil are carried in a tank in the rear, the tools and batteries between the frame, and running boards. The spare tires can be carried in the rear against the bulbous back or on the running boards and fenders. Note the shape of the one-piece oval fenders; they as well as the hood and body are made of aluminum, the best material for automobile body work. The radiator and other metal trimmings are of brass, highly polished. The color is preferably a light one.

The body and hood embody the streamline idea from bumper to tail light and the writer is convinced from what he



Suggested design for a sporting phaeton evolved by Julian F. Brasor, Chicago, Ill.



has actually seen in body construction that this design could be executed by any good body builder. It must be remembered that the secret of handsome design is entirely in the chassis. If the chassis has not been designed with the appearance of the body in mind, the whole will be a hopeless failure and a waste of time, money and energy.

Chicago, Ill.

JULIAN F. BRASOR.

### Best Temperature 170 to 180 Deg.

Editor THE AUTOMOBILE:—I have a 30-hp. Chalmers car. Kindly advise me as to what temperature the water in the radiator must be kept in order to get the best results from the engine, and how the temperature of the water may be found.

2—Which is the best water to use, soft or hard water, or is there no difference?

Rockford, Ill.

L. C. W.

—The best temperature of the water is probably about 170 to 180 deg. If you fit a Boyce Moto-Meter on the radiator cap this will show you when the temperature is right without the necessity of reading it in degrees.

2—Soft water is much to be preferred to hard because it does not make any deposit in the radiator or cylinder jackets.

### Information on Horsepower Taxes

Editor THE AUTOMOBILE:—Kindly give facts concerning the horsepower tax on automobiles.

Has anything been done to bring about the adoption of some horsepower rating based upon piston displacement? Such a method of rating, it seems to me, would be somewhat reasonable, but the idea of rating a 3% by 4 in. engine the same as a 3% by 6% engine is absolutely absurd.

If all engines ran at the same piston speed, which is not the case and never will be, then the old formula  $\frac{B^3}{2.5} \times N = \text{Hp.}$

would mean something. According to this formula the two sizes of engines mentioned would each rate at 22½ hp. for four cylinders. One has a piston displacement of 177 cu. in.

and the other 298 cu. in. With equally good design these two engines could not possibly develop the same power, so why give them the same horsepower rating and why tax them the same?

I think this subject should be of considerable interest to the readers of THE AUTOMOBILE and I hope that someone on your staff will give us some information on it.

Detroit, Mich.

R. E. C.

—You will find the subject of rating and horsepower formulas discussed in an article on pages 700 to 704 in this issue. Rating by the standard formula is, of course, absurd but there are some objections to rating by piston displacement and the  $\frac{D^2N}{2.5}$  formula was really quite good when it was first taken into use.

The horsepower tax on automobiles varies in different States. Practically all the States using this basis of taxation make their ratings by the formula  $\frac{D^2N}{2.5}$  but the amount of the license fee or tax is determined in different ways. In some States the scheme used is to have a fixed fee for cars up to certain horsepower. For example: In New York it is \$5 for cars up to 25 hp., \$10 for cars from 25 to 35 hp., etc. In other States there is a fixed fee for horsepower. It is 50 cents in California. The other States, as a rule, have a set tax without regard to horsepower.

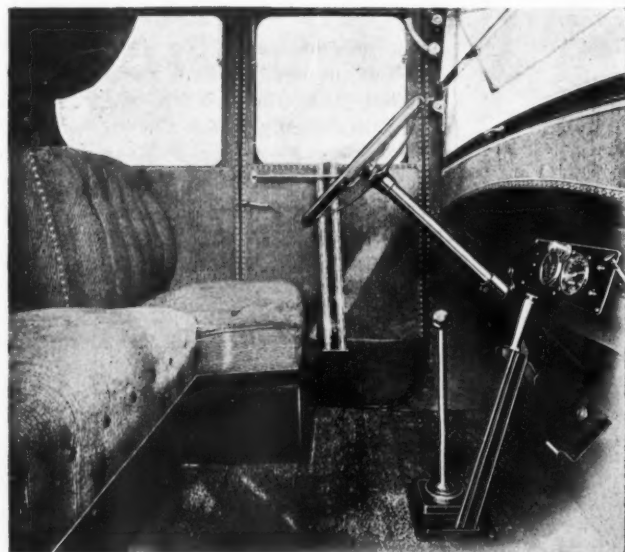
### Raw Linseed Oil as Tar Remover

Editor THE AUTOMOBILE:—Your answer to the inquiry of A. E. J., Westmount, Que., Canada, in THE AUTOMOBILE for Oct. 5, regarding removing tar from a car body prompts me to state that I believe you will find that raw linseed oil will serve the purpose best wherever tar or road oils have been splattered upon the body of the automobile or other finished surface. It is a fact that linseed oil will readily dissolve tar and this residue can be easily washed from the surface of the body without harming the latter, by the use of soap and water.

Philadelphia, Pa.

H. A. M.

## All-Weather Bodies for Allen



Inside view of Allen coupé. Note roominess for passengers in front seat. The driver's seat is located slightly in advance of the other, so that there will be ample space for manipulation of the control levers. The price is \$1,075



Allen roadster and touring car with all-weather bodies. These bodies are convertible, the sedan being of the type in which the roof is permanent and the windows and door fillers can be removed to a compartment, back of the rear seat. Price, \$1,095

# ACCESSORIES

## Constolite for Fords

**T**HIS device is a combination of coils which automatically regulates the light from the headlamps, increases the brilliancy of the light at low speeds and provides for dimming. It also will keep one headlight burning if the other bulb is broken. The device is wired from the magneto and is controlled by a switch on the steering column. The coils are stated by the manufacturer to be so perfectly balanced that the operation of the magneto is not affected in any way. The unit is attached to the right side of the dash under the hood beside the terminal end of the lighting switch. When the headlights are in multiple a light of two to five times as much power as with the standard arrangement is claimed, and at 20 m.p.h. or more the light is constant. No additional wiring is necessary and connections can be made from the instructions furnished with each equipment. The device is waterproof and no adjustment is needed. It sells for \$4.85.—Detroit Starter Co., Detroit, Mich.

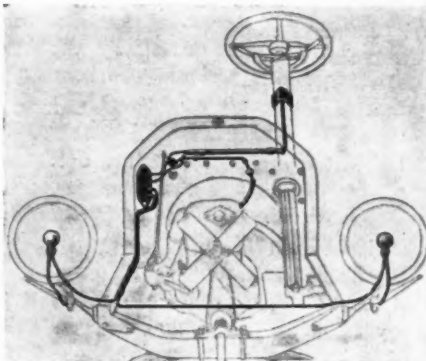
## Stanley Self-Lubricating Spring

The main features of these springs are oil pockets provided in the ends of every leaf so that the springs may be lubricated with an ordinary oilcan. The pockets are fitted with felt pads which retain the oil, so that it is only necessary to supply lubricant two or three times a year. The action of the spring sufficiently distributes the oil throughout the surfaces. Price, Ford, \$4.50 up; Hudson, \$5 up; Cadillac, \$9.50 up; Packard, \$9.50 up; other makes in proportion. —Fulton Sales Co., 910 Michigan Avenue, Chicago.

## Tracford Tractor Attachment

With this device any Ford may be converted into a tractor in 2 hr. It consists of a rectangular sub-frame which bolts onto the rear of the Ford frame, and which carries two heavy steel wheels driven by roller tooth gears on the axle ends, meshing with internal gears on the wheels.

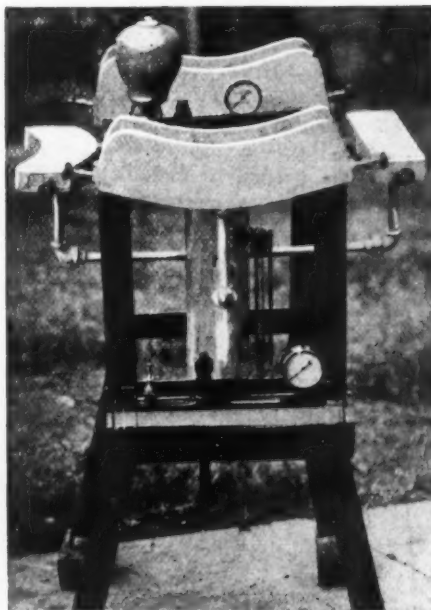
The ratio is 9 to 1, which gives a total reduction of 32.6 to 1. The machine is designed to operate on high gear exclusively, and since the reduction is 9 to 1, the speed of the motor at 2 m.p.h. is equivalent to that of a Ford car running 18 m.p.h. The drawbar pull is, normally, about 1200 lb., and if low gear is used, but only in an emergency, the



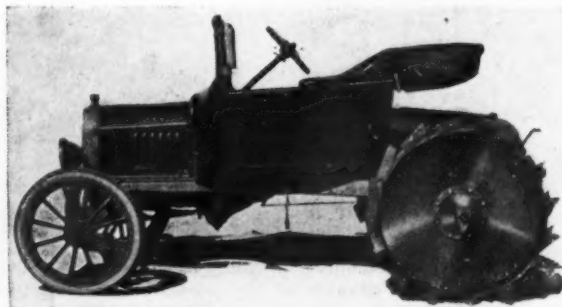
Layout of Constolite headlight regulator



Stanley self-lubricating spring



Anderson steam vulcanizer



Tracford for converting Ford car into a tractor

pull may be anywhere up to 2000 lb. The cooling efficiency is increased by adding a pump.

In attaching the Tracford it is necessary to drill only two holes, one in each side member of the frame. The machine is designed for all sorts of farm work, including drawing spring-tooth harrows, rollers, mowing machines, binders, corn harvesters, potato diggers, and plows. Price, \$125.—Standard Detroit Tractor Co., 1506 Fort Street, West, Detroit, Mich.

## Anderson Steam Vulcanizer

This gasoline-operated steam vulcanizer for repairing tubes and casings is equipped with a large sectional mold which will take care of a 16-in. section in 4-in., 4½-in. and 5-in. tires, and a small sectional mold for sections to 15 in. in 3-in., 3½-in. and 4-in. tires. The tube plate has a capacity of four tubes, and seven tubes can be treated at one time when the section molds are not in use. The normal capacity is three casings and four tubes. Price, \$125, including set of tools.—Anderson Steam Vulcanizer Co., Worthington, Ind.

## Premo Transmission Flanges

A flange for the Ford transmission designed to facilitate the removal and replacement of the cover. It is fitted to the crankcase under the transmission and is tapped to receive the retaining bolts, which are screwed into it instead of into nuts. The retaining bolts are put in from the top and may be tightened up making an even pressure the whole length of the gasket. The advantage of the flange is that it is not required to hold the nuts from below. Price, 75 cents per set.—New York Motor Car Devices Co., Eleventh Avenue, New York City.

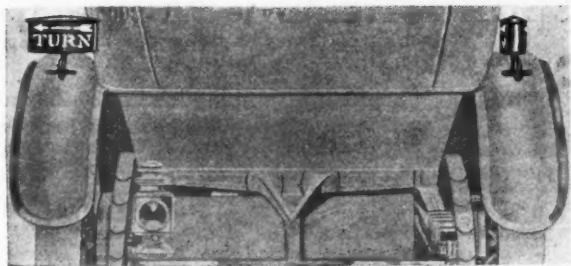
## Kennedy Signal

In this accessory, two signals, one on each of the rear fenders, electrically controlled from the driver's seat, indicate either by night or day the intentions of the driver. Each signal is controlled independently and turns in the direction you intend to go, showing two red lights, an arrow and the word "Turn," and remains a signal until the turn is completed. A pilot light, attached to the switch, shows that the signal is in working order. Price, \$12, complete with wiring and



Premo transmission cover flange for Fords





Kennedy automobile signal

switches.—Nu-Way Tire and Rubber Co., 1004 South Michigan Avenue, Chicago, Ill.

#### Goodrich Lock Switch

A switch for Ford cars operated by a Yale lock. The device takes the place of the regular ignition switch, and may be attached in little time, as its screws fit the screw holes already in the coil box. The switch cannot be removed when locked, as metal shutters cover the screw heads. Throwing off the current to stop the motor locks the switch, thus removing the possibility of forgetting to lock it. Two keys come with each switch. Price, \$3.25.—Goodrich Accessory Assn., 809 Widener Bldg., Philadelphia, Pa.

#### Mecco Creeper

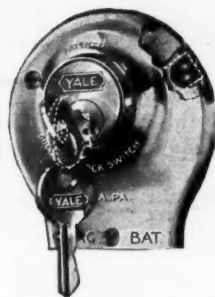
The Mecco creeper is 20 in. wide, 36 in. long, with a smooth steel curved body and padded head rest. There are pockets at the sides for holding tools and small parts. Weight, 15 lb. Price, \$2.—Moeschl-Edwards Corr. Co., Inc., Covington, Ky.

#### Thiefoil Ignition Lock

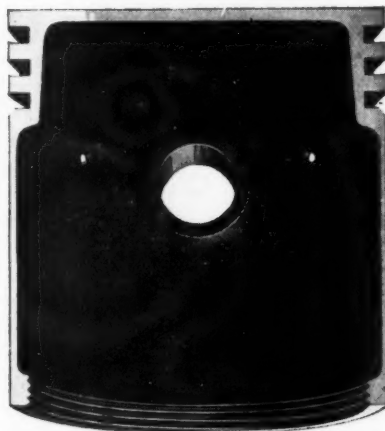
A combination ignition lock that is applied to the face of the standard Ford switch without making any changes in the wiring arrangement. Three buttons project from the top of the lock and each must be pressed the correct number of times to complete the circuit. Pressure on one of the buttons throws the switch off. Each of the buttons operates a notched disk that must be rotated until the notches come in line. A trip-pin



Thiefoil ignition lock



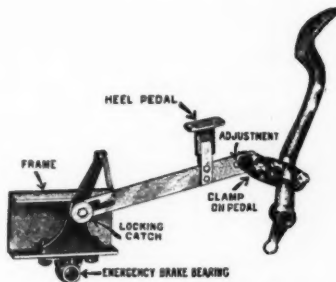
Goodrich switch lock. By its use the switch is locked when the motor is shut off



Semi-steel piston. Note the thin walls and drilled holes for the return of excess oil to the crankcase



Mecco creeper for use under car



N. Y. clutch control for Fords

then falls into the groove and the lock mechanism is released. More than 1000 working combinations are possible and the entire installation may be made by the purchaser. Price, \$3.50, complete with hose and connection.—Caskey-Durpee Mfg. Co., Marietta, Ohio.

#### N. Y. Clutch Control

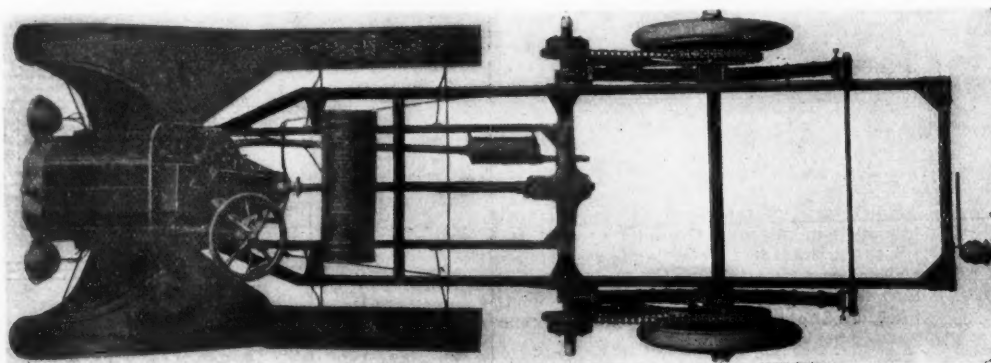
This device permits the clutch of the Ford to be locked in the neutral position. A pedal operated member connects the clutch pedal to a hanger bolted to the frame just above the emergency brake bearing. A spring holds the locking catch from acting until pressure is placed on the locking pedal, the device having no effect on the operation of the clutch pedal in changing from low to high. The installation requires no machine work and may be done by the owner. Price, \$3.—New York Coil Co., 338 Pearl Street, New York City.

#### Semi-Steel Pistons

These light semi-steel pistons are made for any car. They are cast from metal patterns and because of the thin wall are extremely light, though strong. The weight of the piston for Buick cars is 1 lb., 11 oz. Cylinders are rebored by this company, fitted with new pistons, rings, wristpins and bushings; shipment made in 24 hr. after receipt of cylinders. Price, \$2.80 each, for Buicks, all other cars in proportion.—Allen & Curtiss Co., 415 S. Main Street, Mishawaka, Ind.

#### Truckford Attachment

Converts a Ford into a 1-ton truck, leaving the chassis intact. The Ford rear axle becomes the jackshaft and carries the sprockets for the chain drive, the attachment bolting on over the frame. The lengthened frame gives a loading space of 8½ to 11½ ft. back of the driver's seat, making the wheelbase 128 in. Solid rubber tires are used on the rear and carry almost the entire load. The Truckford may be attached by two men in a short time, and may as readily be removed and the original body replaced. Price, \$350.—Robinson Machine Co., Detroit, Mich.



Truckford attachment for converting Ford car into a 1-ton truck

## Kerosene Is Choice of Independent Oil Men

(Continued from page 683)

Dr. Lucke discussed this subject very fully in a lengthy paper on kerosene devices which he read at the June meeting of the Society of Automobile Engineers this year. On that occasion he stated very positively that the problem of successfully burning kerosene in an ordinary automobile engine had been solved.

### Starts on Kerosene

The Good vaporizer uses a heating device which consists of a very long venturi contained within the exhaust header. This venturi is made as long as the design of the header permits, and mixture is fed to this venturi by an ordinary carbureter. This naturally delivers a very wet and unsatisfactory sort of gas, but this is changed to a warm dry mixture at the far end of the vaporizing tube, whence it is taken directly to the intake header. In the section shown in Fig. 1, it will be noticed that the intake manifold is arranged directly beneath the exhaust, so that the gas does not have to pass around the cylinders in order to get to the intake valves. Dr. Lucke states that this assembly permits precisely the same delicacy of throttle control and as good idling as can be had with gasoline. An essential feature is the placing of the throttle between the spray nozzle of the carbureter and the vaporizing venturi. The effect of the throttle is to disturb the nature of the gas and of the heated venturi to remove the effects of such disturbance. One of the main virtues of the Good instrument is the great length of the venturi, because this permits a very high velocity in the front, while it does not cause the great drop of pressure and therefore limit the possibility of cylinder filling.

The most interesting feature of the Good system is that it permits an engine to be started up exactly as though it were operating on gasoline. Passing

through the intake manifold from end to end is a small tube of thin steel. At the end of this is a burner fed with kerosene sprayed by a small electric blower and ignited by a series of sparks which can be provided either by a magneto or by a battery fitting. Dr. Lucke says that this vaporizing tube will attain a red heat in 15 sec. and when in this condition it will vaporize any mixture reaching the intake manifold to a sufficient extent to enable the engine to be started and to permit it to fire regularly until the main venturi heats up.

The burner operates so quickly that the whole engine and the burner can be started simultaneously. If the engine is cranked with the ordinary self-starter and the blower is in operation simultaneously, the time taken to start is, according to Dr. Lucke, the same as that required for starting with heavy gasoline in cold weather. It is best, however, to arrange to control the blower independently so that it can be started by pressing a button a few seconds before the main engine is cranked. By this means the deposition of kerosene in the intake manifold or in the cylinders is prevented. Dr. Lucke says that with this device there is no smoke and little carbon accumulation and that the operator would never know that he was using kerosene except that in cold weather he would have less starting trouble than he now experiences with gasoline.

### September Gasoline Exports Increase 83 per Cent

WASHINGTON, D. C., Oct. 23—Exports of gasoline during September totalled 37,857,477 gal., an increase of 17,230,058, or 83 per cent, as compared with 20,627,419 gal. shipped abroad in September, 1915. Exports of gasoline for the 9 months ending September were 274,816,625 gal., an increase of 67,757,366 gal. over the corresponding period of 1915.

Lubricating oil totalling 23,690,556 gal. was exported in September, an increase of 5,197,105 gal. over September, 1915. Shipments for the 9-months' period were 204,513,350 gal., a gain over the same period in 1915 of 21,737,145 gal.

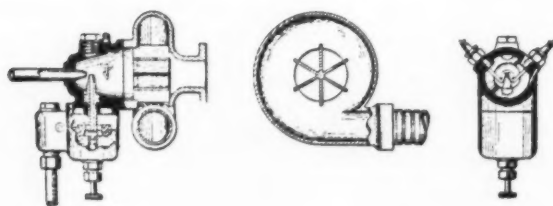
Illuminating oil exports were 89,189,368 gal. in September as against 68,381,361 gal. in September, 1915, and for the 9 months ending September 637,830,762 gal., compared with 643,964,310 in the same period of 1915.

### Packard-Missouri Managed by Loomis

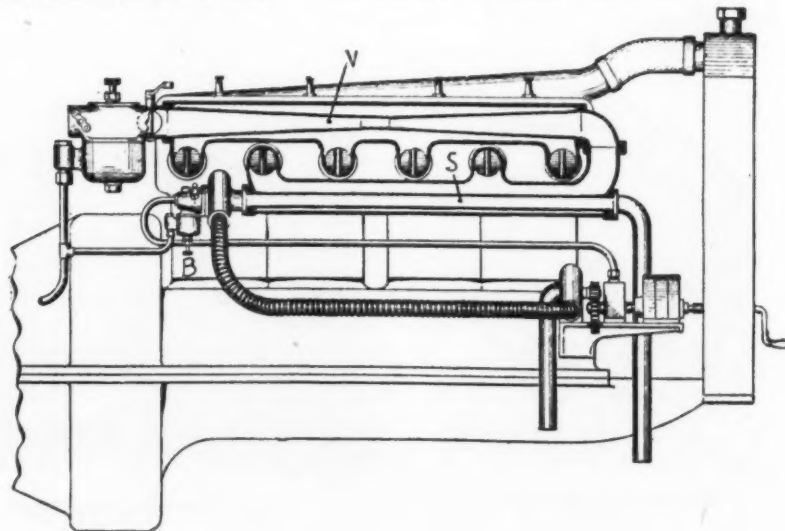
DETROIT, MICH., Oct. 23—G. S. Loomis, formerly in charge of the Packard interests at Louisville, Ky., is now the general manager of the Packard-Missouri Motor Co., St. Louis. H. W. Spaulding who formerly held this position has been made vice-president in charge of sales.

### Ward Leonard Patent Licensees

BRONXVILLE, N. Y., Oct. 25—One of the largest patent licensing transactions was concluded to-day when the estate of the late H. Ward Leonard, originator of the Ward Leonard Electric Co. of this place, granted a non-exclusive license under all of Ward Leonard's electrical patents to the General Electric, Westinghouse, and Cutler-Hammer companies. The consideration is perhaps the largest that has ever been paid in a patent license arrangement. In all, upward of seventy-five Ward Leonard patents are concerned in the deal. A feature of the deal is that all three companies agree to recognize the work of Ward Leonard by having the system in their product known as the Ward Leonard system. The field covers such electrical controls as used for mine hoists, turret training, rheostats, circuit breakers, rolling mills, and everything excepting controls for automobile lighting and gearboxes.



Arrangement of the Good kerosene vaporizing system, showing the long venturi V in the exhaust header. Starting is accomplished on kerosene by means of the electrical lights burner B, which heats the tube S in the inlet manifold. The detail sketches show the construction of the burner





# Industrial Miscellany

## Factory

**Goodyear Tire & Rubber Co.**, Akron, Ohio, has posted notices in its plant informing all workmen that beginning Nov. 1 the regular 8-hr. workday schedule will be effective. For nearly 2 years the firm has been gradually working toward that goal. Some of the departments have been on an 8-hr. schedule for some time.

**Good-Wear Rubber Co.**, maker of tires and other rubber goods, will operate a plant in Elyria, Ohio, at the Topliff & Ely plant. Within 4 months, the company expects to be turning out from 160 to 200 tires per day. About 100 men will be employed at the start. Jacob Murbach of the Elyria Milling Co. will be vice-president and W. E. Brooks, president of the Elyria Telephone Co., will be treasurer of the company.

**Western Malleables Co.**, Beaver Dam, Wis., maker of automobile castings, is improving its works. The Elm Street plant is being enlarged by a brick and steel addition, 26 by 90 ft., and a new and larger core room and sand shed. An air compressor room is being erected at the South Street plant.

**Aluminum Castings Co.**, Cleveland, Ohio, has started work on a large plant development to be devoted to the Lynite pistons. The company has purchased 18½ acres at East Forty-ninth Street and the Newburg & South Shore Railroad. The price was about \$75,000. The first factory building to be built is to cost \$125,000. It is to be 900 ft. long. The company expects to occupy it by December. Other buildings will be erected as needed.

**Canadian National Carbon Co.** will build a factory at Toronto, Ont.

**Ontario Steel Products, Ltd.**, Brockville, Ont., is making extensive additions to its plants at Brockville, Ont., and

Chatham, Ont. The company recently signed up contracts with three automobile companies for springs which will cover production for nearly 3 years.

**Perfection Motor & Tire Co.**, Madison, Wis., will erect a plant in Niagara Falls, Ont., to cost \$35,000.

**Maple Leaf Tires, Ltd.**, Belleville, Ont., has secured a factory site there of 22 acres and building operations will be commenced at once. The main building will be nearly 300 ft. long and will be of concrete and steel construction, and will cost approximately \$100,000.

**Maxwell Motor Car Co.** will commence work at Windsor, Ont., shortly on the erection of a plant to cost \$60,000. A site was purchased some time ago.

## Personals

**E. M. Taber**, truck sales manager for Russell P. Taber, Hartford, Conn., has been promoted to be manager of the wholesale department which covers Reo passenger and commercial vehicles. Under his new assignment he will have entire charge of the wholesaling of Reos in the territory covered by Taber, nearly all of the State. W. E. Walker succeeds E. M. Taber as manager of the truck department.

**W. H. Wetherell**, head of the Saxon department of Frank G. Robins, Inc., Hartford, Conn., and formerly a member of the firm of Kingsbury & Wetherell, has joined the Saxon factory forces as a district representative.

**F. A. Wright**, St. Louis, has been appointed sales manager for the Weber Motor Car Co., Studebaker distributor, that city.

**C. Snyder** has become general works manager of the Parker Rust Proof Co. of America, Detroit, manufacturer of rustproof liquid for motor vehicles. He

was formerly superintendent of manufacture for the Chalmers Motor Co.

**W. Leahy**, of Albany, N. Y., has disposed of his holdings in the Kingsbury-Leahy Co., designer and builder of automobile bodies, to devote his attention to other business interests.

**J. L. Wierengo** has been appointed general manager of the Detroit Truck Co., Detroit, maker of the Tonford truck. Mr. Wierengo was formerly the advertising manager and sales manager for the Continental Motors Co.

**W. E. Kenyon** has resigned as general sales manager of the Sandow Motor Truck Co., Chicago, his resignation to take effect Nov. 15. His future connections will be announced later.

**S. E. Straight** will be in charge as branch manager of the Savage Tire Corp. factory branch in Detroit.

**H. K. Reinoehl** has resigned from the Sayers & Scovill Co., Cincinnati, maker of motor-driven funeral cars. He has joined the A. Howard Co., Galion, Ohio, as chief engineer.

**J. E. Dockendorff & Co.**, 20 Broad Street, New York City, has been appointed general export agent by the Central Steel Co., Massillon, Ohio.

**Mason Motor Car Co.**, New York City, has taken on the Monroe car in connection with the Ross Eight.

**Adams-Bagnall Electric Co.**'s New York office is now located in the Engineering Building, 114 Liberty Street, under the management of F. C. Perkins, Eastern representative.

**H. W. Johns-Manville Co.** has opened a branch office at Great Falls, Mont., on the fourth floor of the Ford Building, in charge of J. H. Roe. With the opening of the Great Falls office the Johns-Manville Co. increases its number of branches to fifty-five.

## The Automobile Calendar

### ASSOCIATIONS

- Oct. 25-26—Columbus, Ohio, Automobile Trade Assn., second annual meeting, Virginia Hotel.
- Oct. 26—Philadelphia, Pa., Section meeting of Society of Automobile Engineers. Paper by Herbert Chase.
- Dec. 2-9—Electricians' Country-wide Celebration.
- Jan. 9—New York City, National Automobile Chamber of Commerce, Annual Banquet at Waldorf-Astoria.
- Jan. 9-11—New York City, Society of Automobile Engineers Mid-Winter meeting, Thursday, Jan. 11, S. A. E. day. Annual Banquet, Hotel Biltmore, Special performance Ziegfeld's Midnight Follies.

### CONTESTS

- Oct. 28—New York Speedway Race, championship.
- Nov. 16 and 18—Santa Monica, Cal., Vanderbilt Cup and Grand Prix Races.
- Nov. 18—Phoenix, Ariz., 100-mile free-for-all Track Race. Arizona State Fair.
- Nov. 30—Uniontown, Pa., Speedway Race.

- Nov. 30—Los Angeles, Cal., Ascot Speedway 200-mile Championship Race.

### 1917

- April—Los Angeles to Salt Lake City Road Race.
- May 19—New York Metropolitan Race on Sheepshead Bay Speedway.
- May 30—Indianapolis Speedway Race, Championship.
- June 9—Chicago, Ill., Speedway Race, Championship.
- June 23—Cincinnati, Ohio, Speedway Race.
- July 4—Omaha, Neb., Speedway Race, Championship.
- July 14—Des Moines, Iowa, Speedway Race, Championship.
- July 28—Tacoma, Wash., Speedway Race, Championship.
- Aug. 4—Kansas City Speedway Race.
- Sept. 3—Cincinnati, Ohio, Speedway Race, Championship.
- Sept. 15—Providence, R. I., Speedway Race, Championship.
- Sept. 29—New York, Speedway Race, Championship.
- Oct. 6—Kansas City Speedway Race.
- Oct. 13—Chicago Speedway Race.

- Oct. 27—New York Speedway Race.

### SHOWS

- Nov. 10-18—Providence, R. I., Show, Rhode Island Automobile Dealers' Assn.
- Nov. 20-25—Worcester, Mass., Show, Worcester Casino; Worcester Automobile Dealers' Assn.
- Dec. 2-9—Springfield, Mass., Show, Auditorium. H. W. Stacey, Mgr.
- Dec. 30-Jan. 6—Cleveland, Ohio, Sixteenth Annual Show, Wignmore Coliseum, Cleveland Automobile Club.
- Jan.—First Pan-American Aeronautic Exposition, New York City; Aero Club of America, American Society of Aeronautic Engineers, Pan-American Aeronautic Federations.
- Jan. 6-13—New York City, Show, Grand Central Palace, National Automobile Chamber of Commerce.
- Jan. 9-10—Fort Dodge, Ia., State Convention, Iowa Retail Automobile Dealers' Assn.
- Jan. 20-27—Detroit, Mich., 16th Annual Show, Detroit Automobile Dealers' Assn.

- Jan. 27-Feb. 3, 1917—Chicago, Ill., Show, Coliseum, National Automobile Chamber of Commerce.
- Jan. 20-27—Montreal, Que., Automobile Trade Assn.
- Feb.—Newark, N. J., Show, First Regiment Armory.
- Feb. 3-10—Minneapolis, Minn., Show, Minneapolis Automobile Trade Assn.
- Feb. 10-18—San Francisco, Cal., Pacific Automobile Show, G. A. Wahlgreen, Mgr.
- Feb. 18-25—St. Louis, Mo., Show, Auto Manufacturers' and Dealers' Assn.
- Feb. 19-24—Syracuse, N. Y., Show, State Armory, Syracuse Dealers' Assn.
- Feb. 26-March 3—Omaha, Neb., Show, Auditorium, Omaha Automobile Show Assn.
- March 6-10—Boston, Mass., Show, Mechanics' Bldg., Boston Automobile Dealers' Assn.
- March 6-10—Ft. Dodge, Iowa, Northern Iowa Show, New Terminal Warehouse, G. W. Tremain, Secretary.
- March 14-17—Davenport, Ia., Show, Coliseum Bldg., Tri-City Automobile Trade Assn.

**L. B. Miller**, St. Louis, has resigned as manager of the St. Louis branch of the U. S. Tire Co., to become general sales manager for the Inland Machine works, makers of the Inland piston rings. Mr. Miller had been with the U. S. Tire Co., since March 1, 1913 and manager in St. Louis since Dec. 1, 1915.

**A. E. Schaefer** has been appointed business manager of the Scripps-Booth Corp., Detroit. Mr. Schaefer was the business manager for the Sterling Motor Co., prior to its merger with Scripps-Booth.

**Fred W. Chaffee** has been made the manager for the George W. Franklin Co., Detroit. Mr. Chaffee was connected with the Dort.

**H. S. Farish** has been appointed assistant to the president and general manager and also purchasing agent of the Abbott Corp., Cleveland.

**E. Guenther** has been appointed manager of the accessory store of the Puritan Machine Co., Detroit. Mr. Guenther was formerly accessory salesman.

**W. P. Kennard** has been employed by the King Motor Car Co., Detroit, as a travelling sales representative—his territory at the present time is in the middle west.

**M. C. Bias** has been appointed purchasing agent of the Mitchell Motors Co., Racine, Wis., to fill the vacancy caused by the resignation of Guy W. Morgan, who has become president and general manager of the Abbott Corp., Cleveland, Ohio. Mr. Bias served as assistant purchasing agent under Mr. Morgan.

**Henry Fink**, Milwaukee, has been appointed sales manager of the Columbus branch office of the Sterling Motor Truck Co., Milwaukee, Wis.

**A. G. Waddell** has been appointed special representative of the Chevrolet Motor Co., on the Pacific Coast, with headquarters at the new Chevrolet factory at Oakland, Cal. He will have charge of the advertising of the states of California, Oregon, Washington, Idaho, Utah, Nevada, Arizona, New Mexico and the Islands of the Pacific.

**Alvan T. Fuller** of Boston, Mass., has extended his Packard agencies to New Bedford, where he has placed F. C. Graves in charge of a new branch just opened there.

**J. T. Clinton** has been sent from New York to Boston to take charge of the New England branch of the Firestone Tire & Rubber Co., succeeding T. J. Glenn, who has secured a long leave of absence due to illness.

**J. B. Dub** has been transferred from Atlanta, Ga., where he managed the Studebaker branch, to the branch at Worcester, Mass. The latter company has just leased new salesrooms and service station on Main Street.

**J. R. Corby**, St. Louis, has been appointed manager of factory branch in that city of Chicago Pneumatic Tool Co., makers of Little Giant truck.

**Earl Freese**, Indianapolis, Ind., has been appointed manager of the Logansport, Ind., branch of the Gibson Co., Overland distributors and accessory dealers. He will succeed E. C. Kurman who has been made manager of the Gibson company's Indianapolis branch.

**F. E. A. Brock**, St. Louis, Secretary of the Vesper-Buick Auto Co., has resigned that position to enter the candy trade in this city. He will be succeeded by E. R. Stewart, salesman, who

will become assistant manager. Oscar Norris of the Maxwell Branch, Kansas City, succeeds Mr. Stewart. Mr. Brock had been with the Vesper-Buick Co., since Mr. Vesper came here as Buick distributor.

**C. F. Barth** has been made works manager of the C. R. Wilson Body Co., Detroit. During the past three years he has been factory and production manager of the Murphy Chair Co., Detroit.

**G. D. Wilson** has been made manager of production and sales of the C. R. Wilson Body Co. and will also have charge of the inspection department. For the past four years he has been production manager.

**T. J. Turk**, chief engineer of the Interstate Motor Co., Muncie, Ind., has been appointed assistant general manager of the company. He will also retain charge of the engineering department.

**W. I. Ballentine**, Indianapolis, Ind., formerly general superintendent of the Link Belt Co.'s Indianapolis works, has resigned to accept the position of works manager of the Chain Belt Co., Milwaukee.

## Dealer

**J. Edward Jones and V. R. Washburn**, who have been connected with the sales department of the Ohio Auto Sales Co., Columbus, have formed a sales firm known as the Jones-Washburn Motor Co., to be located in Piqua, Ohio, to handle Dodge.

**Lichtlie Automobile Co.**, Toledo Ohio, will open a branch in Lima at once. G. H. Hack will be manager. It will handle the Chandler and National.

**Hudson-Phillips Motor Car Co.**, St. Louis, has opened a special truck department at their salesrooms, 3301 Locust Street, for Diamond T and Vim trucks.

**Henry Hotze & Son**, St. Louis, has taken the agency for The Pilot cars. George A. Frey is manager of the salesrooms opened at 2809 Locust St.

**Federal Truck Co.**, St. Louis, has been selected as distributor for Troy trailers.

**Henderson-Overland Co.**, Youngstown, Ohio, with a capital stock of \$100,000, has been formed to take over the sale of Overland cars in North Eastern Ohio and Western Pennsylvania which was formerly conducted by James A. Henderson.

**Chamberlain Automobile Co.**, agent for the Apperson and Velie cars at New Bedford and Fall River, Mass., has bought the S. Leyden garage at Fall River and placed W. T. Sandeman of Boston in charge of the agencies there.

**Louis Jandorf** is going out of the automobile body selling field. A sale was held Oct. 17 at the New York building.

**Times Square Auto Supply Co.**, New York City, has opened a branch at 880 Nassau Street.

**Bearing Service Co.**, Detroit, is establishing a branch in Kansas City, at 2205 Grand Avenue, and will open about Nov. 1.

**Chevrolet Motor Co.**, Kansas City, Mo., will establish a wholesale and parts department in the Firestone building, retaining the present quarters at 1610 Grand Avenue for retail and service department.

**Chalmers Motor Sales Co.**, Kansas City, Mo., will soon move from 1506-08

McGee Street to 2615-17 Walnut Street, where it will occupy the basement and first floor of the recently completed Shukert building.

**O. E. Morehouse and S. C. White**, Kansas City, Mo., formerly successful grocers, have formed the Pullman Motor Sales Co., to retail and distribute Pullmans in this territory. G. W. Compton, division sales manager of the Pullman company, will handle the distribution department.

**Columbia Tire & Rubber Co.**, Seattle, Wash., has opened quarters at 905 East Pike Street, from which station Columbia tires will be distributed to Western Washington points.

**Reinhard Bros. Co.**, Minneapolis, dealers in accessories, will have a new four-story building on Ninth Street near Hennepin Avenue. The building will be ready Feb. 1 and will cost \$75,000.

**Welling Motor Equipment Co.**, St. Louis, has been organized by Conrad A. Welling of the Monarch Auto Repair Co., to handle the Ford starter made by the Detroit Starter Co., and the Compensating Vapor Plug. The salesroom will be at 613 Chestnut Street.

**Moreland Motor Truck Co.**, Los Angeles, will shortly begin the construction of an assembly plant in Seattle, which will be the Northwest distribution point for their product.

**E. A. Allen** is the manager of a new tire store in Seattle at Broadway and Pine Street, and will handle the Lancaster Wiregrip tires.

**W. D. Sharp Co.** has been organized in Seattle to handle the Cole line, and salesrooms and service station have been opened at Tenth Avenue and Seneca Street.

**O. E. Logan** of the Chalmers Auto Co., Spokane, Inland Empire distributor for the Chalmers, closed with C. F. Kolle of Kalispell, Mont., to handle the Chalmers. T. C. Martin has contracted to handle the Chalmers line at Pullman, Wash.

**W. W. Trumbull**, manager of the Spokane Auto Co., has contracted to distribute Oakland cars to all points in Washington east of the Cascades and in Idaho north of Salmon River.

**Fowler Motor Car Co.** has taken on the Kissel-Kar line for Springfield, Mass., and vicinity.

**New England Velie Co.** is now located in its new building, 1123 Commonwealth Avenue, Boston, where it has executive, sales and service departments all in one structure.

**Chalmers Motor Co.** of New England moved into a new building at Portland, Me.

**New York Lubricating Oil Co.**, Denver, is the new name for the Monogram distributing agency for Colorado, Wyoming and New Mexico, at 1441 Wazee Street, formerly called the Dickey Oil Co. G. B. Hayward, a salesman for the former concern, is manager of the new Western branch, and W. G. Dickey, head of the former Denver agency, has gone to Kansas City to manage the branch there under the name of the New York Lubricating Oil Co.

**Tom Botterill**, Denver, Pierce and Hudson distributor for Colorado, Wyoming and New Mexico, and Dodge dealer for Denver and vicinity, with headquarters at East Thirteenth Avenue, Broadway to Lincoln Street, has secured the Colorado, Wyoming and New Mexico distributing agency for the Pierce truck.